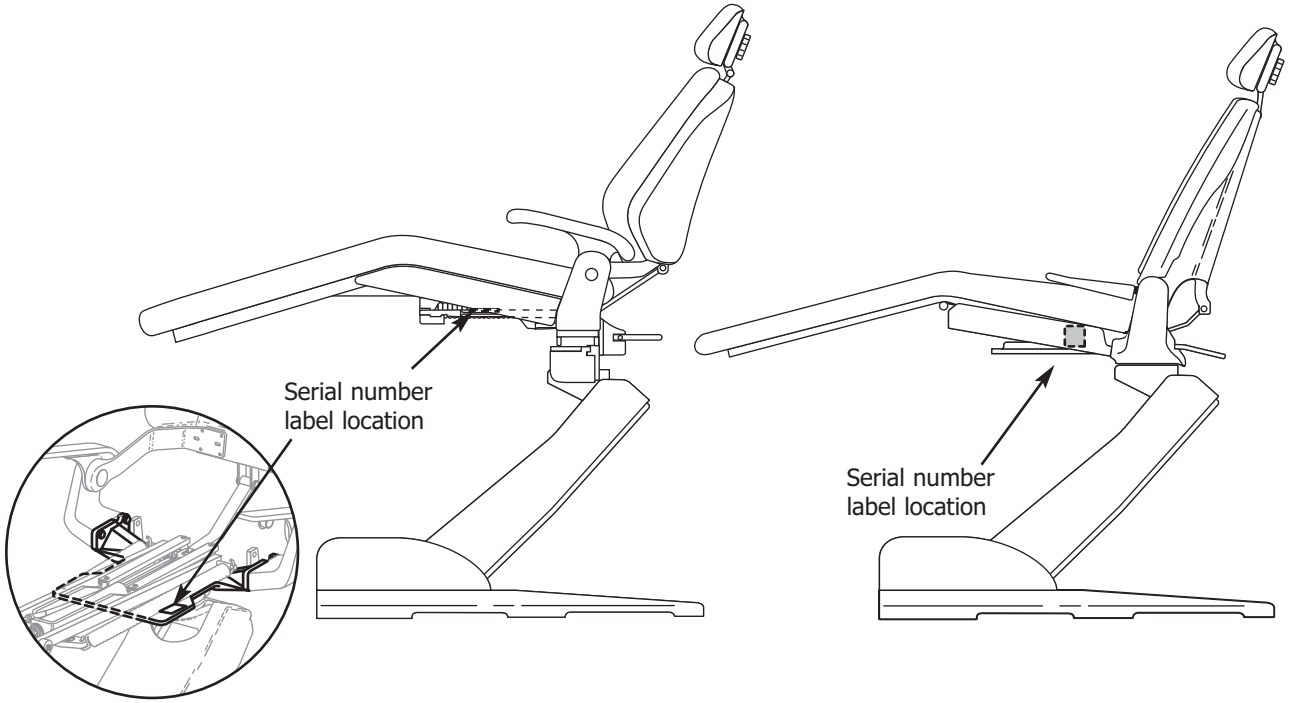
A-dec model 1040, 1021 and 8000 chairs are electronically controlled, hydraulically powered dental chairs. Buttons on both the touchpad and 8-button footswitch and actuators on the 8-function footswitch are used to position and program auto-positioning functions into the chair. The hydraulic system is controlled by the electronic control module using relays and solenoid-actuated valves.

This section provides information related to locating serial/model numbers, servicing, maintenance, and adjustment of chairs. Detail on how to service chairs and troubleshoot specific problems related to them is presented.

Locating Serial/Model Number

The serial/model number tags identify the chair model and manufacture date. The label can be found either on the top surface of a chair's upper structure (raise the toeboard) or on the right-hand side of the upper structure. If you have difficulty locating the serial/model number label, the following example may be helpful.



Decade 1021/1011 Chair

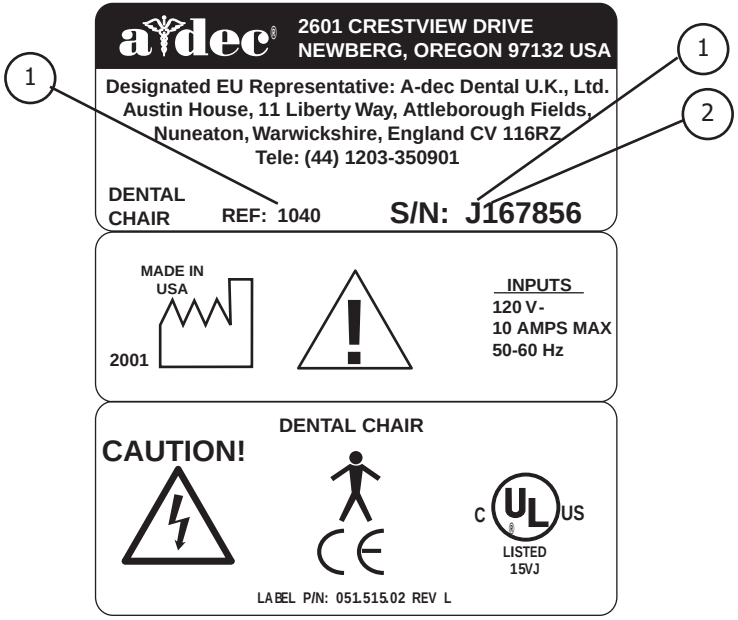
Cascade 1040 Chair

Reading the Manufacture Date

Different models of the chair can be identified by referring to the "REF" number. Each chair is further identified by its month and year of manufacture.

This example shows how to identify the model and month and year of manufacture of the chair.

Item #	Description
1	Model number
2	The first letter of the serial number indicates the month the product was manufactured; e.g., A is January.
3	First digit indicates the year of manufacture.



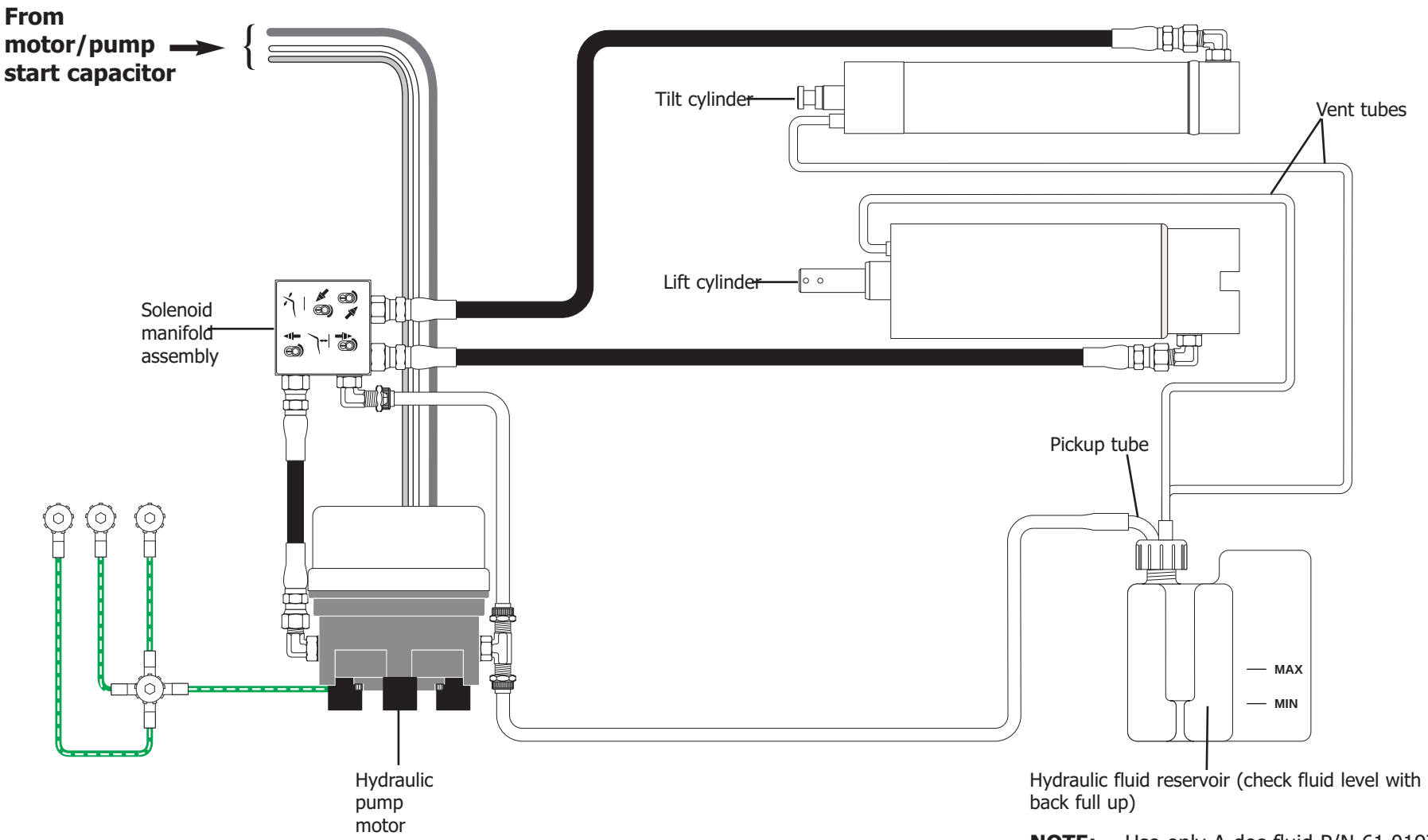
Serial/Model Number Label

Working with Hydraulics

The hydraulic system consists of the following:

Part	Description
Hydraulic fluid reservoir	The fluid level in the reservoir can be seen through the sides of the reservoir and is serviced via a top fill cap.
Hydraulic cylinders	The hydraulic cylinders control the base lift and back functions. Springs and gravity retract the rod during base and back down functions.
Motor-driven hydraulic pump	The hydraulic pump and the starter capacitor supply hydraulic fluid from the reservoir, under pressure, to the chair lift and tilt hydraulic cylinders for back up and base up functions.
Solenoid/manifold assembly	This assembly gates hydraulic fluid to and from the two cylinders. Depending on the chair function called for, the controller selects which solenoid-actuated manifold valves are opened or closed. The solenoid/manifold assembly also includes four adjustable needle valves used to restrict or divert the flow of hydraulic fluid to and from the lift and tilt cylinders. These valves provide the rate of travel adjustment for chair base and back movement.

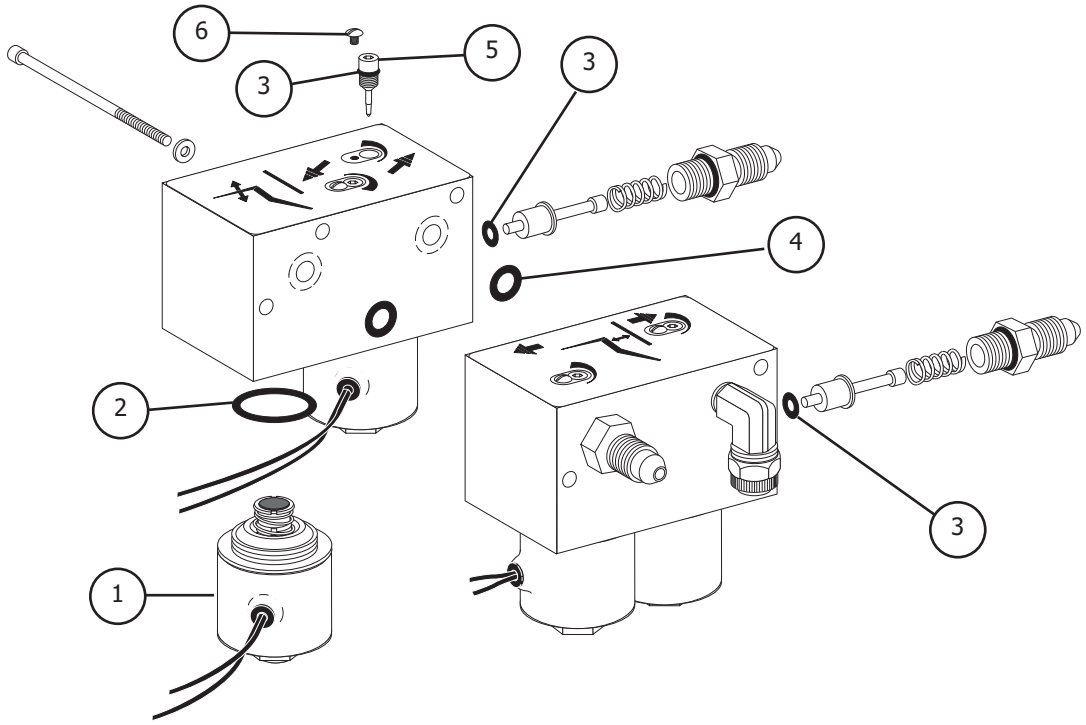
Hydraulic System Flow Diagram



NOTE: Use only A-dec fluid P/N 61.0197.00.

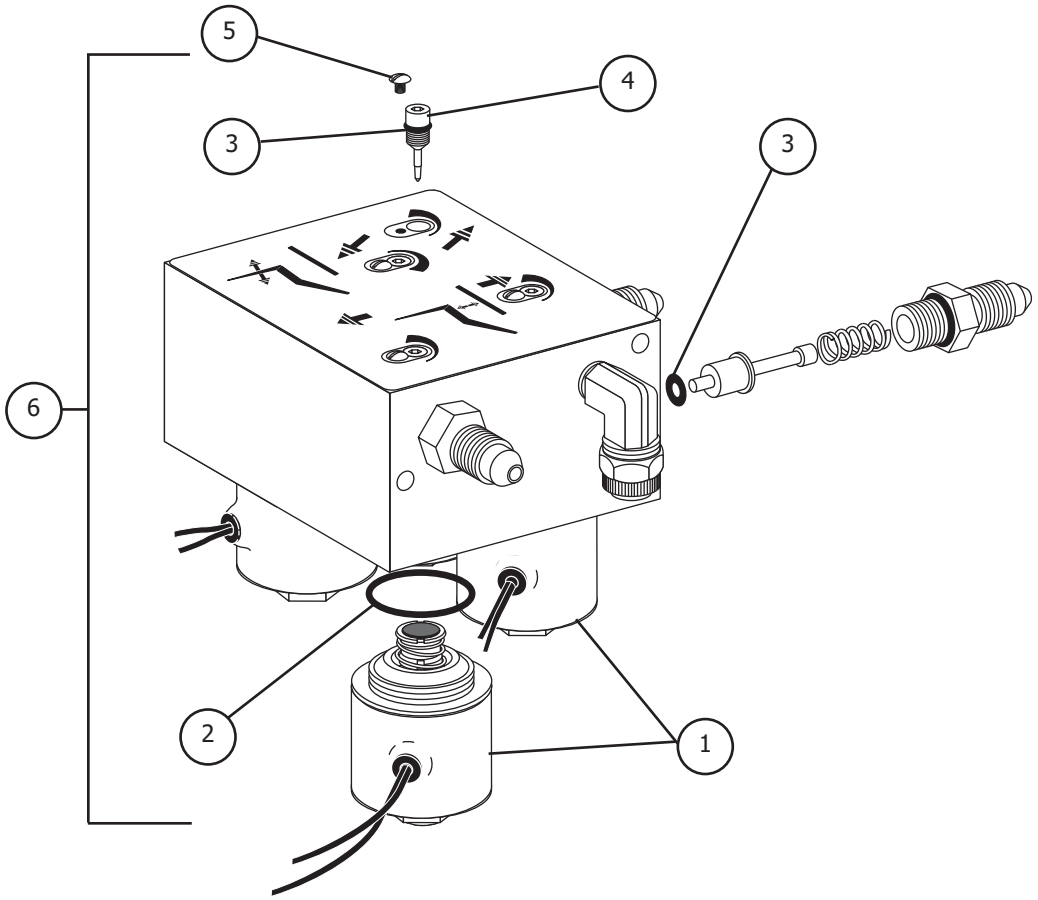
Hydraulic Manifold

Item #	Part Number	Description
1	61.1335.00 61.1336.00 61.1337.00	Solenoid, (8-watt, 100V, Yellow wires) Solenoid, (8-watt, 120 V, Black wires) Solenoid, (8-watt, 240 V, Red wires)
2	035.041.02	O-ring, special pkg 10
3	030.004.02	O-ring, AS568-004 pkg 10
4	030.010.00	O-ring, AS568-010 (only on dual-block manifolds)
5	61.0460.00	Flow adjust screw with o-ring
6	001.002.00	Screw, truss-head slot



Hydraulic Manifold

Item #	Part Number	Description
1	61.1335.01 61.1336.01 61.1337.01	Solenoid, (8-watt, 100V, Yellow wires) Solenoid, (8-watt, 120V, Black wires) Solenoid, (8-watt, 240V, Red wires)
2	030.015.02	O-ring, pkg 10
3	030.004.02	O-ring, AS568-004 pkg 10
4	61.0460.00	Flow adjust screw with o-ring
5	002.118.01	Screw, button-head, socket
6	61.1332.00 61.1333.00 61.1334.00	Manifold assy, hyd, 100V Manifold assy, hyd, 120V Manifold assy, hyd, 240V



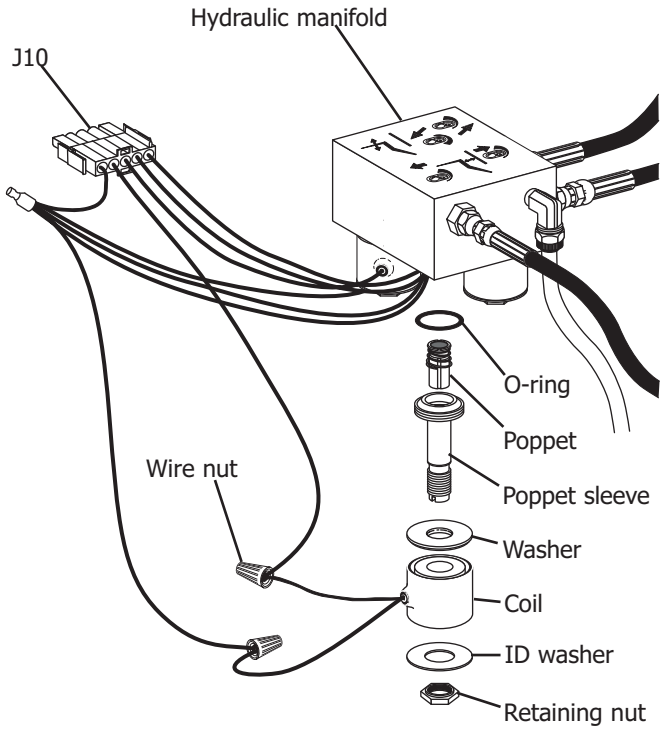
Removing a Solenoid

WARNING

The solenoid coils are powered by line voltage (100, 120, or 240V AC). Failure to unplug the chair may result in serious injury from electrical shock.

The following steps will guide you through the removal of a solenoid.

Task	Description
1	Lower the chair base and back to the full down position to depressurize the hydraulic system. Remove the motor pump cover, then unplug the chair.
2	If necessary, remove the two mounting screws that secure the manifold to the hydraulic tray. Rotate the manifold so the solenoids are accessible.
3	Using a flat blade screwdriver and a 9/16" wrench, remove the defective solenoid.
4	Cut the defective solenoid wires 3" (74mm) from the coil and discard.
5	Remove the old o-ring from the solenoid cavity and completely dry the cavity. Replace the o-ring (refer to Solenoid installation instructions for correct o-ring).



Removing a Solenoid

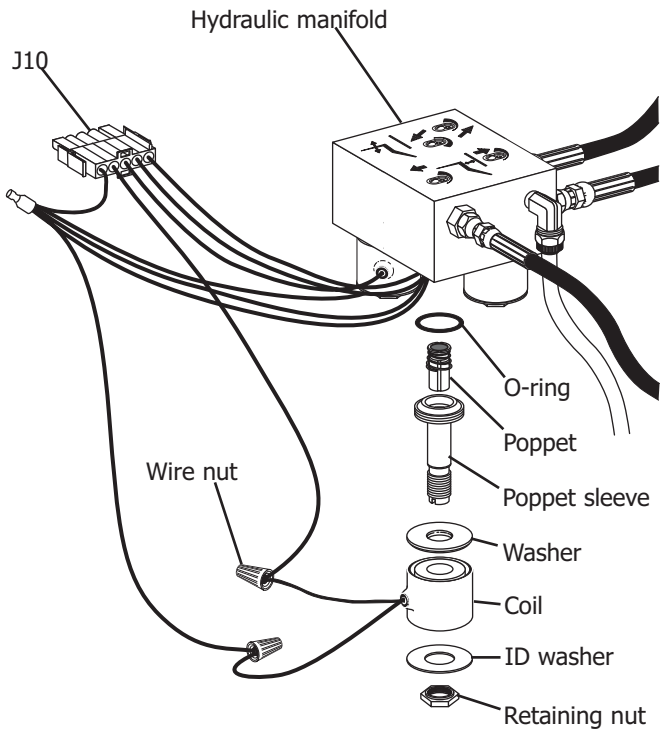
Replacing a Solenoid

WARNING

The solenoid coils are powered by line voltage (100, 120, or 240V AC). Failure to unplug the chair may result in serious injury from electrical shock.

The following steps will guide you through replacing a solenoid.

Task	Description
1	Install the new solenoid stem and poppet into the manifold and tighten to 35-40 in lb (.11085-.2284 Nm). Position the remaining solenoid parts on the stem and secure by tightening the retaining nut to 25-30 in lb (.14275-.1713 Nm).
2	Cut the solenoid wires 3" (75 mm) from the coil. Install the stripped wires from the solenoid and the connector housing into a wire nut. Repeat for the remaining wire.
3	Using the mounting screws, secure the manifold to the hydraulic tray.
4.	Plug in the chair. Test the chair functions to ensure proper operations and that no fluid leakage occurs. Reinstall the motor pump cover.



Replacing a Solenoid

Adjusting the Hydraulic Manifold

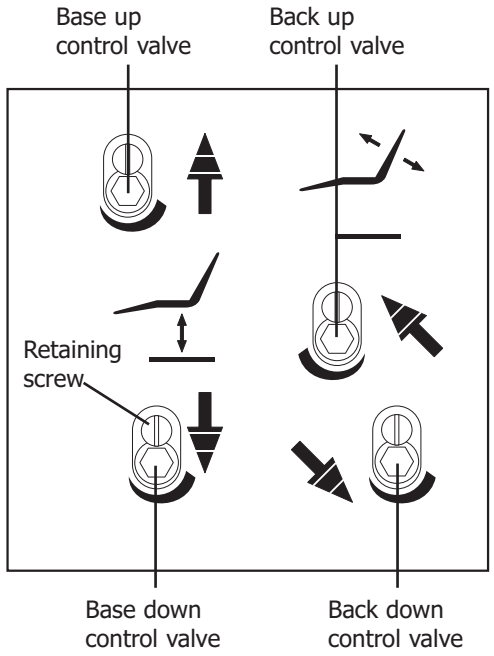
The hydraulic manifold incorporates four speed control valves, which restrict or divert the flow of hydraulic fluid to and from the lift and tilt cylinders.

NOTE: The speed control valves are hex drive.

CAUTION

Do not completely close a speed control valve. The motor/pump could overheat and become damaged from pumping against a closed valve. Do not remove retaining screw from the control valves.

To adjust...	Do this...
Base up speed	Turn base up control valve: clockwise to decrease speed, or counterclockwise to increase speed.
Base down speed	Turn base down control valve: clockwise to decrease speed, or counterclockwise to increase speed
Back up speed	Turn back up control valve counterclockwise to decrease speed, or clockwise to increase speed. **NOTE:** This is opposite of the other three control valves. Turning the back up valve counterclockwise too far may prevent the back from moving up.
Back down speed	Turn the back down control valve: clockwise to decrease speed, or counterclockwise to increase speed.



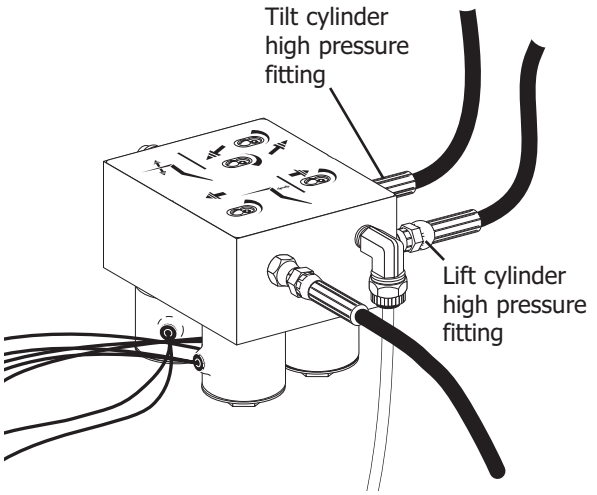
Adjusting the Hydraulic Manifold

Correcting Hydrostatic Lock

Hydraulic lock occurs based on the following conditions:

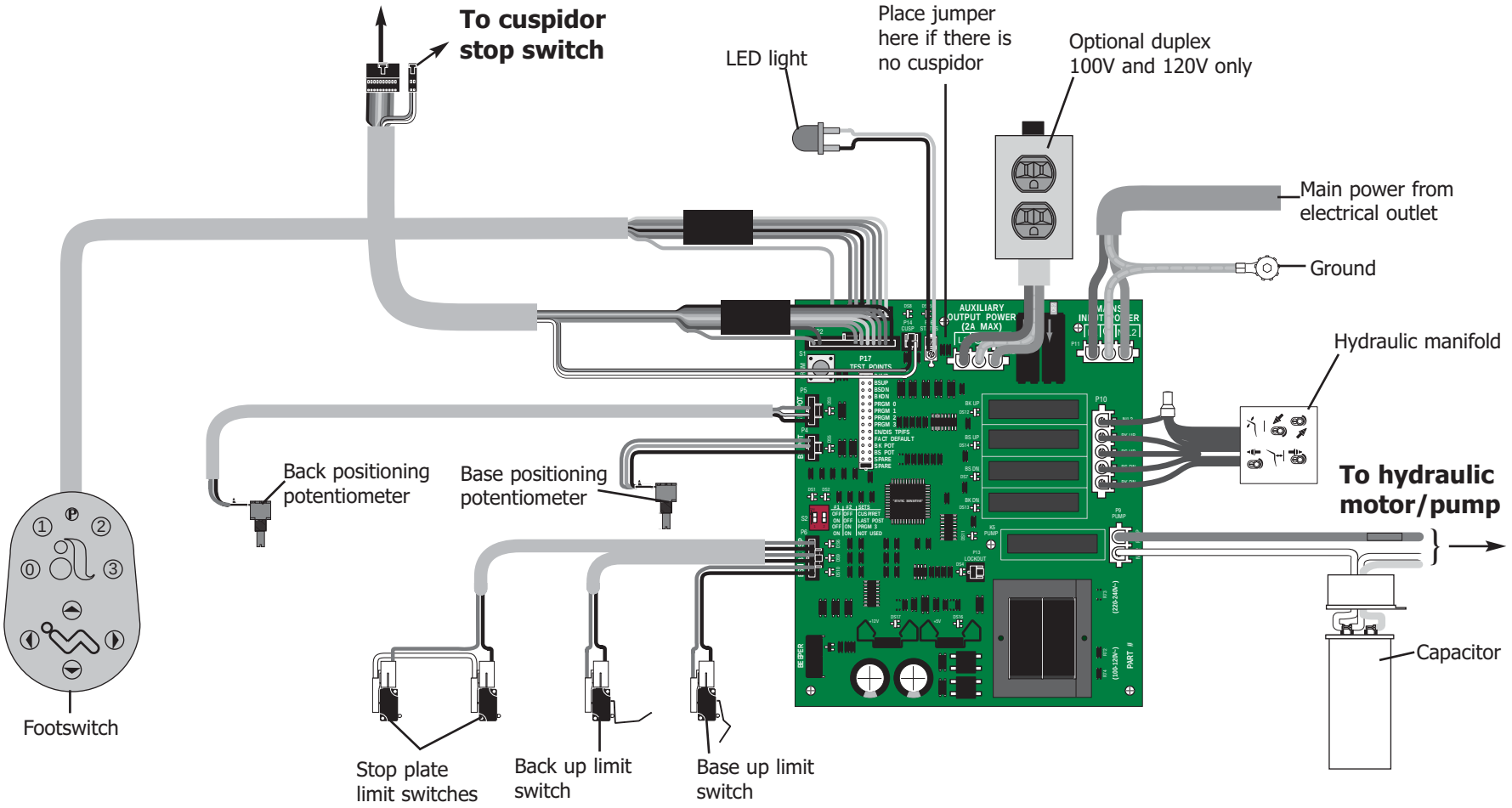
- chair base or back is stuck in full up position
- limit switch not activated, or
- down solenoid poppet is unable to open based on excess hydraulic pressure.

Task	Description
1	Remove the motor/pump cover from the chair.
2	Fit a 5/8" wrench to the high pressure outlet port (either lift or tilt, whichever is in hydrostatic lock) of the hydraulic manifold. Hold the port still and use a 9/16" wrench to loosen the hose fitting.
3	Place a shop rag around the fitting to absorb the fluid.
4	Carefully loosen the fitting counterclockwise until oil begins to leak from the fitting. Retighten the fitting. Operate the down function. A second release of hydraulic fluid may be required.
5	Adjust the limit switch that caused the hydrostatic lock (refer to *Adjusting the Base Up Limit Switch*). In some cases, it may be necessary to remove and replace the limit switch. Adjust the new limit switch as needed. Also ensure that the large gear/actuator is securely installed and not slipping.
6	Cycle the chair a couple of times to verify it is no longer in hydrostatic lock.

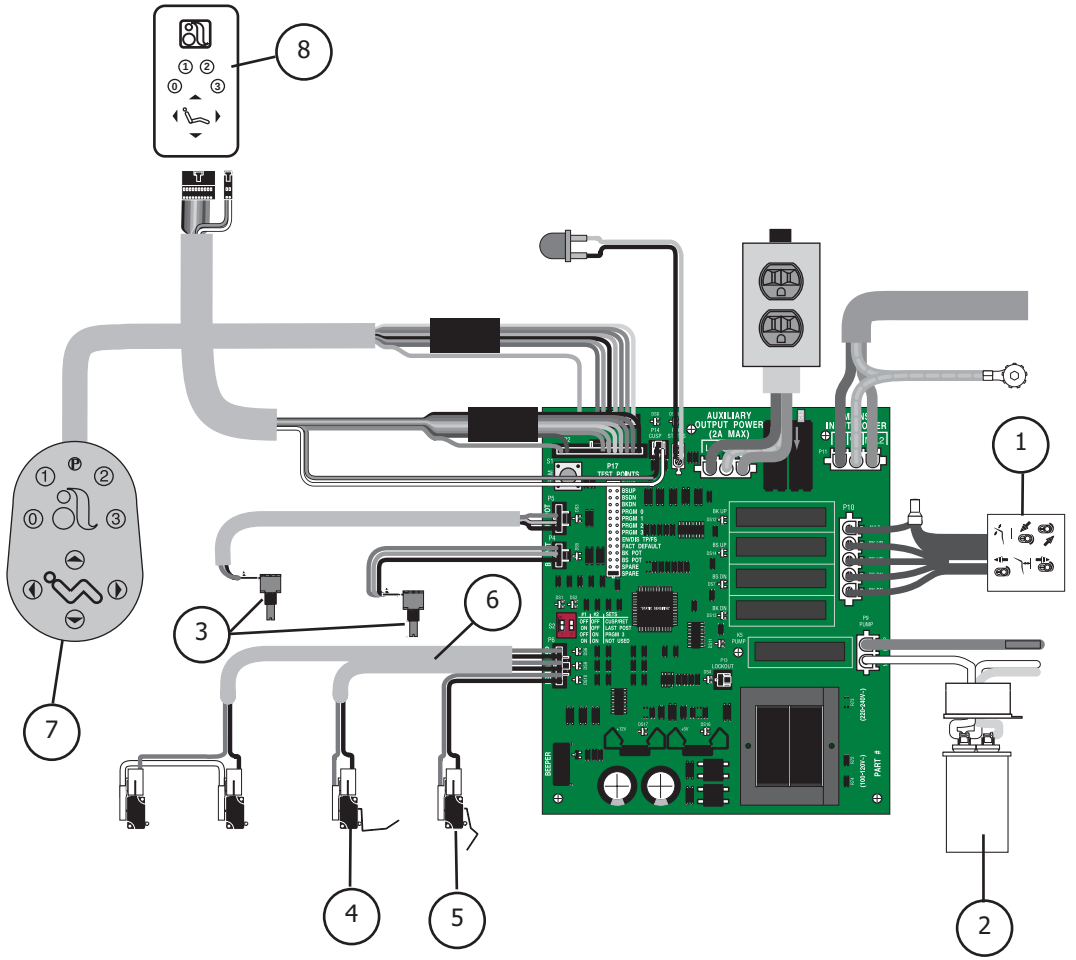


Correcting Hydrostatic Lock

NOTE: If there is no cuspidor, remove jumper from cable and place on board



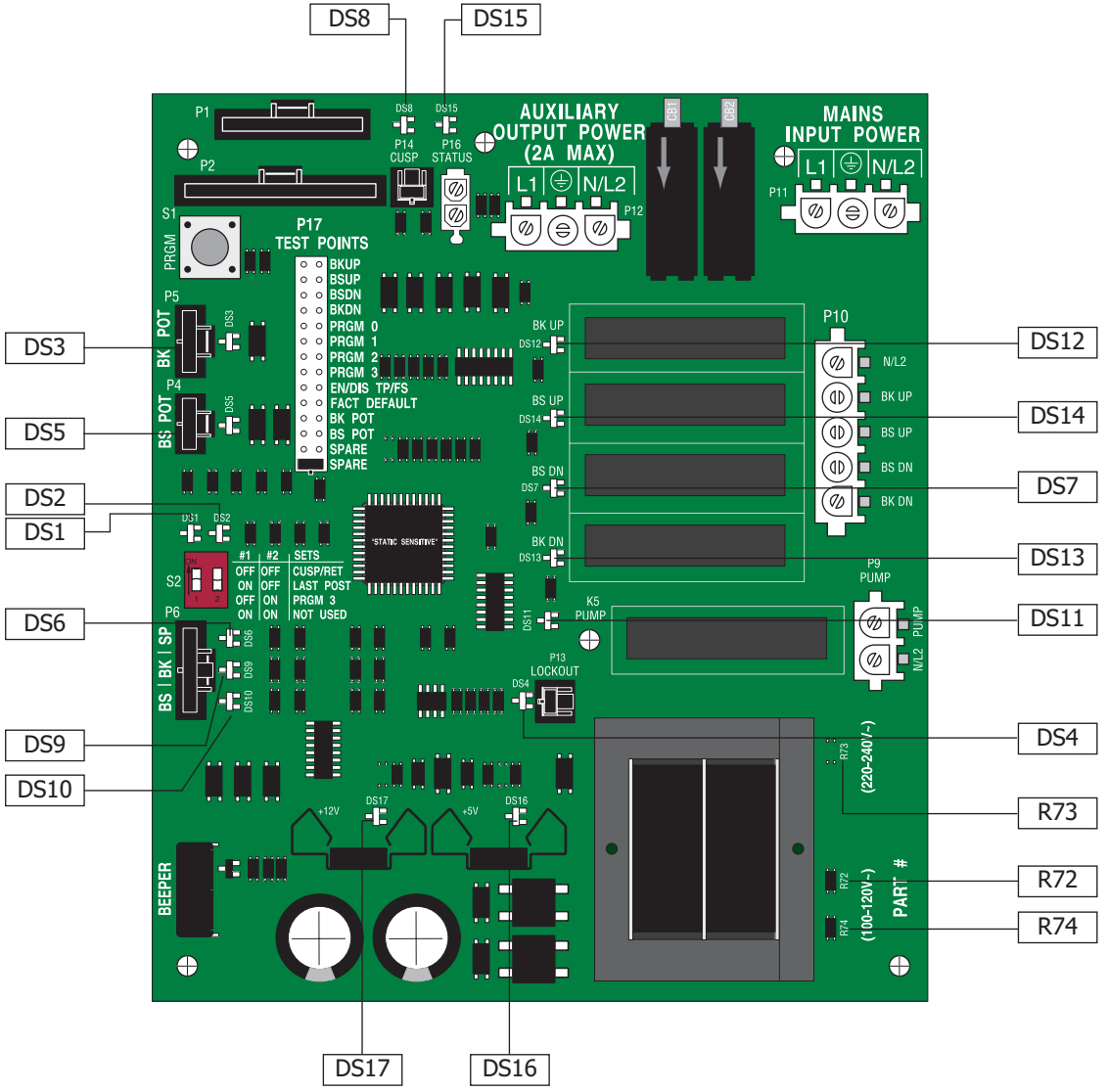
Item #	Part Number	Description
1	61.1332.00 61.1333.00 61.1334.00	100V, Yellow wires 120V, Black wires 240V, Red wires
2	90.1031.00 90.1034.00	Capacitor with boot (100-120V) Capacitor with boot (240V)
3	041.372.00	Positioning potentiometer
4	61.2065.00	Back up limit switch
5	044.184.01	Base up limit switch
6	61.2099.00	Cable assy, tilt switch (1040) only
7	61.3043.00	8-button footswitch
8	39.1045.00 39.1385.00 39.1090.00 39.1090.00	Chair touchpad Performer touchpad Cascade Master with cuspidor Cascade Master w/o cuspidor



To Replace Circuit Board P/N	Order this kit
61.2510.00 61.1214.01 61.1373.01	90.1029.00 (100-120V)
61.2512.00 61.1217.01	90.1029.01(220-240V)

LEDs

NOTE: Refer to Testing Factory Defaults for more details.



LED	Description	Information Communicated
DS1 DS2	S2 (red DIP switch) is ON	Switch is ON
DS3	Back Potentiometer LED ON	Back potentiometer is functioning normally when the chair back is moving
DS4	Handpiece Lockout LED ON	Lockout enabled
DS5	Base Potentiometer LED ON	Base potentiometer is functioning normally when the chair base is moving
DS6	Chair Stop Plate Limit Switch LED ON	Chair stop plate limit switch activated
DS7 DS11 DS12 DS13 DS14	Base Down LED Pump LED Back Up LED Back Down LED Base Up LED	Relay is ON when LED is ON and the function is moving
DS8	Cuspidor Limit Switch LED ON	Cuspidor limit switch activated, or jumper is missing
DS9	Back Up Limit Switch LED ON	Back Up limit switch activated
DS10	Base Up Limit Switch LED ON	Base Up limit switch activated
DS15	Status LED ON	ON: Normal operation OFF: Microcontroller is not functioning. Verify voltage regulator LEDs (DS16 and DS17) are ON. Is the chair plugged in? Circuit breaker tripped? Slow Blink: Check cuspidor (DS8) and stop plate (DS6) limit switch LEDs Fast Blink: Check handpiece lockout (DS4) LED Double Blink: A SPARE jumper is in the FACT DEFAULT position
DS16	5V Regulator LED OFF	1. Power to circuit board is OFF, or 2. There is a short in the cable to the base or back potentiometer. Disconnect all cables except the power cable. Plug the cables in one at a time (the LED will turn ON when the problem is fixed).
DS17	12V Regulator LED OFF	1. Power to circuit board is OFF, or 2. There is a short in the cable to the status light or limit switch (the LED will turn ON when the problem is fixed).

Testing and Programming the Circuit Board

WARNING

The chair will begin to move automatically during this test; to avoid injury or equipment damage, remove all possible obstructions and maintain a safe distance from the chair. To interrupt the chair cycle, press any button on the touchpad or footswitch, or activate the chair stop plate.

Follow these steps to test and program the chair circuit board.

Task	Description
1	Insert the SPARE jumper into the FACT DEFAULT location (on P17). Result: The chair will cycle the base and back movements and automatically reprogram the memory positions to the factory settings (position 0 to entry/exit; 1 and 2 to the same pre-programmed positions; and 3 to cuspidor/return). If the circuit board beeps three times, continue with step two. If the circuit board beeps just once, the chair cycle has been interrupted. Diagnose and correct any errors, then press either circuit breaker for five seconds to restart the cycle (refer to *Testing Factory Defaults*).
2	Move the jumper from the FACT DEFAULT location (on P17) back to the SPARE location. **NOTE:** The jumper must be in the SPARE position for normal chair functions and safe operation.
3	Press "1" on the touchpad or footswitch, or the green position on the 8-function footswitch. Result: The chair will move to the operating position.
4	Press "0" on the touchpad or footswitch, or the red button on the 8-function footswitch. Result: The chair will move to the entry/exit position. **NOTE:** The chair programmable position buttons can be reprogrammed to the desired positions as specified by the dental team.

Testing Factory Defaults

The table lists conditions and corrective actions for testing the factory defaults for LEDs.

Problem	Action
Factory Default test will not start (LEDs DS15, DS16 and DS17 are Off)	

If . . .	Then . . .
Transformer thermal limiter is open	Wait for transformer to cool off.
Circuit breaker is tripped	Reset circuit breaker (short circuit fault currents may damage the circuit breaker and prevent it from resetting).

Factory Default test will not start (LED DS15 is Off; DS16 and DS17 are ON)

If . . .	Then . . .
Input voltage is too low or is outside the required range	Verify input voltage and voltage selection resistors (100-120VAC=R72 and R74) (220-240VAC=R73).
Microcontroller is not functioning	Replace the circuit board.

Factory Default test will not start (LED DS15 is blinking; DS16 and DS17 are ON)

If . . .	Then . . .
Input voltage is too low or is outside the required range	Verify input voltage and voltage selection resistors (100-120VAC=R72 and R74) (220-240VAC=R73).
Microcontroller is not functioning	Replace the circuit board.

Problem	Action

Factory Default test halts during the BASE UP test and the PCB board beeps one time

If . . .	Then . . .
Input voltage is too low or is outside the required range	Verify input voltage and voltage selection resistors (100-120VAC=R72 and R74 (220-240VAC=R73).
Base Up limit switch is activated	Verify switch operation.
Motor thermal limiter is open, motor is hot	Wait for motor to cool off.
Motor capacitor is defective	Test capacitor and replace, if needed.
Base Up solenoid is defective	Test solenoid and replace, if needed.
Base is in hydrostatic lock	Refer to *Correcting Hydrostatic Lock*.
Potentiometer is not changing voltage	Verify potentiometer LED comes ON when base is moving. Check potentiometer mechanical drive and electrical connections.

Factory Default test halts during the BACK DOWN test and PCB board beeps one time

If . . .	Then . . .
Stop plate limit switch is activated	Verify switch operation.
Stop plate is jammed	Remove and reinstall the stop plate.
Back Down solenoid is defective	Test solenoid and replace if needed.
Back is in hydrostatic lock	Refer to *Correcting Hydrostatic Lock*.
Potentiometer is not changing voltage	Verify potentiometer LED is ON when back is moving. Check potentiometer mechanical drive and electrical connections.

Problem	Action

Factory Default test halts during the BACK UP test

If . . .	Then . . .
Back up limit switch is activated	Verify switch operation.
Back Up solenoid is defective	Test solenoid and replace, if needed.
Back is in hydrostatic lock	Refer to the *Correcting Hydrostatic Lock*.
Potentiometer is not changing voltage	Verify potentiometer LED is ON when back is moving. Check potentiometer mechanical drive and electrical connections.

Factory Default test halts during the BASE DOWN test

If . . .	Then . . .
Stop plate limit switch is activated	Verify switch operation.
Base Down solenoid is defective	Test solenoid and replace if needed.
Base is in hydrostatic lock	Refer to *Correcting Hydrostatic Lock*.
Potentiometer is not changing voltage	Verify potentiometer LED is ON when base is moving. Check potentiometer mechanical drive and electrical connections.

Chair moves by itself when power is turned ON

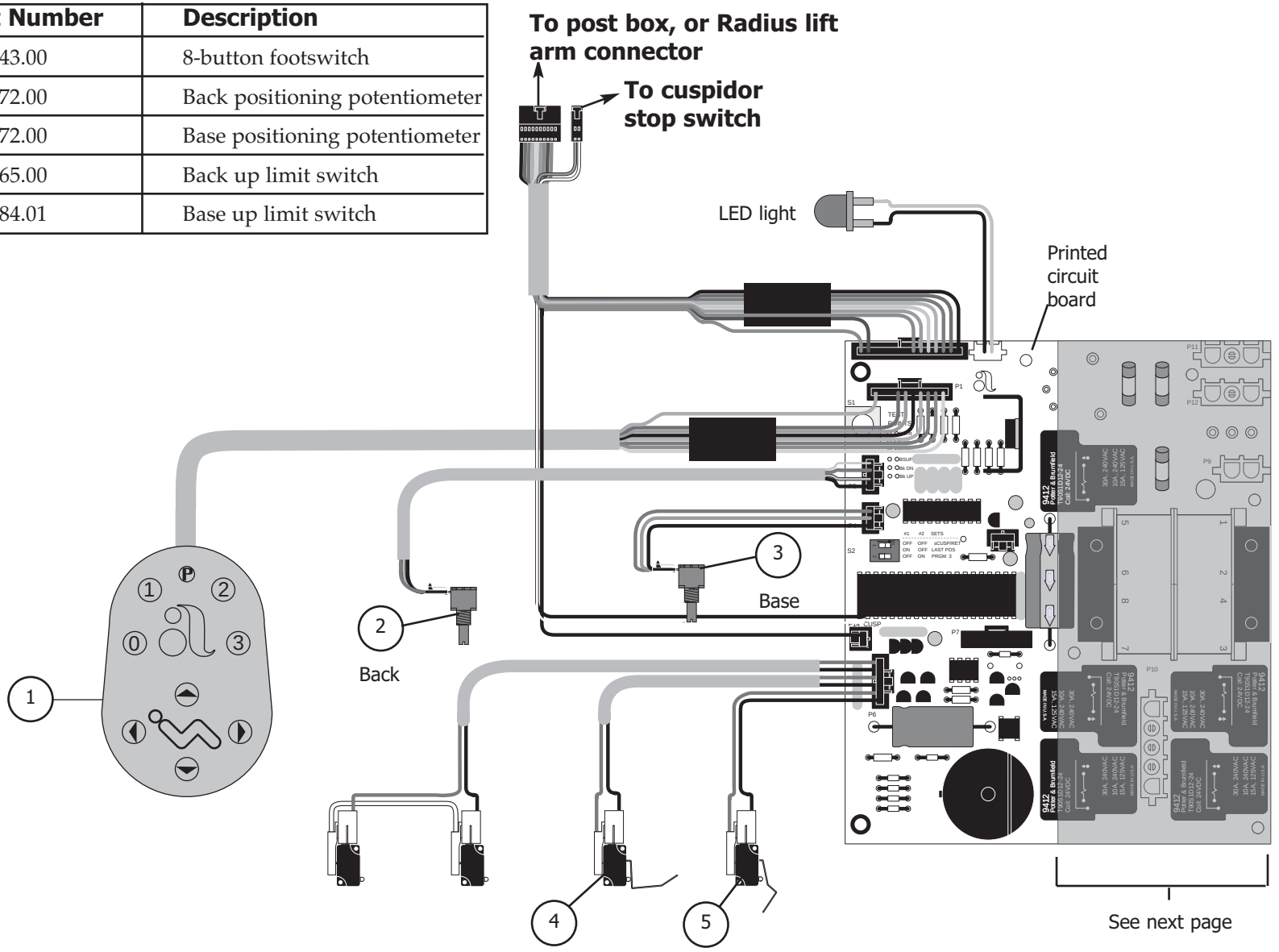
If . . .	Then . . .
The jumper is in FACT DEFAULT position	Verify that the jumper is in the SPARE position.
Short circuit in touchpad or footswitch	Unplug the touchpad and footswitch; reset the circuit breaker. If the problem isn't repeated, the touchpad or footswitch may have shorted.
Short circuit on circuit board	Replace the circuit board.

Identifying New Features

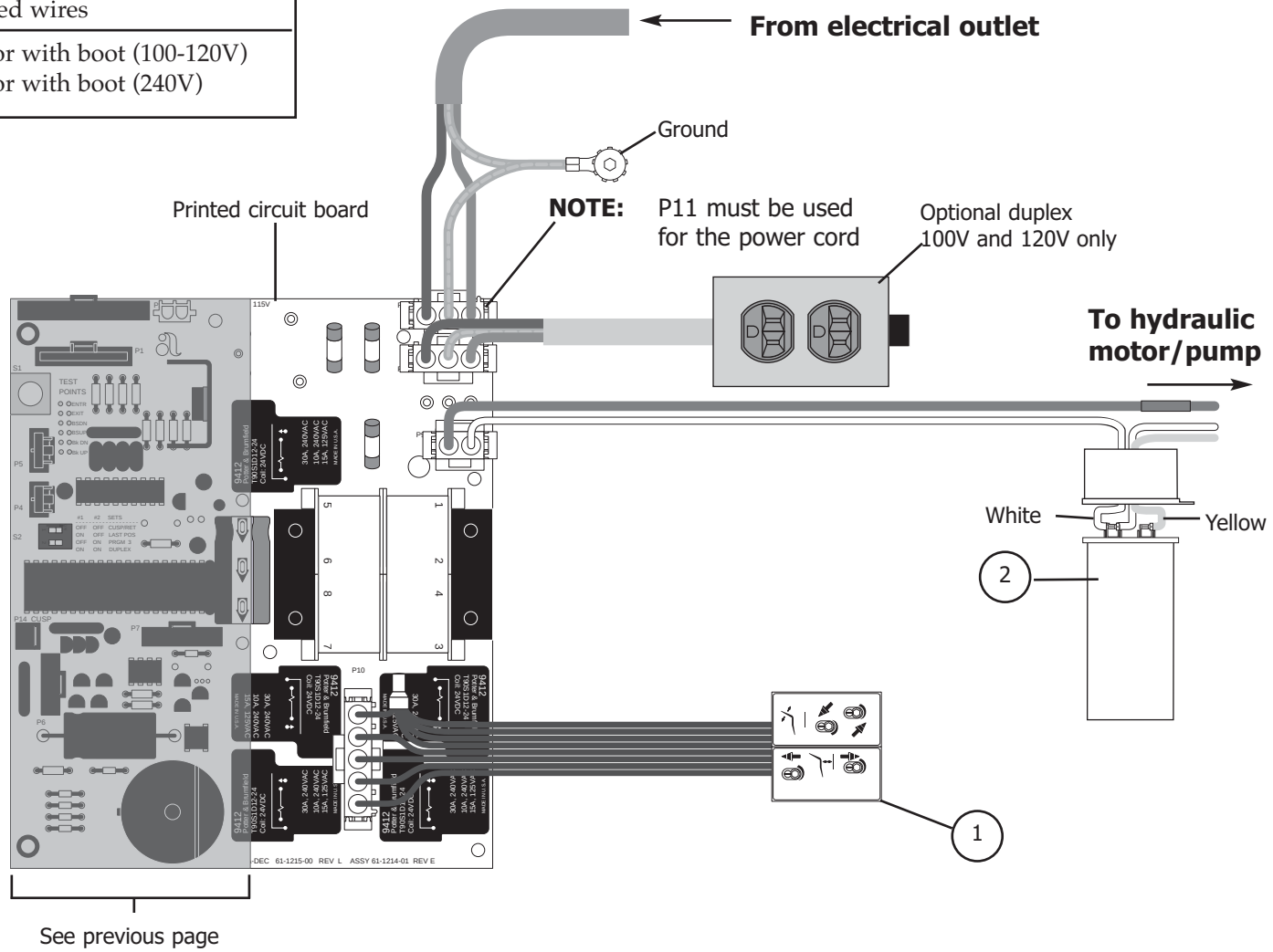
The chart provides information on new features and associated programming on the PCB.

Feature	Programming
Raise the chair with the stop plate limit switch	Plug the chair into an electrical outlet. Tap the chair stop plate three times within five seconds and hold on the third tap. Result: The chair base will continue to rise as long as the stop plate is held in. This function is automatically disabled after five minutes but is re-enabled upon each power up. To reset the five-minute timer, depress either circuit breaker until the LEDs turn OFF, then release the circuit breaker.
Enable and disable touchpad and footswitch buttons	Place the SPARE jumper in the EN/DIS TP/FS position of the Test Points header P17. Push the buttons to be Enabled or Disabled (PRGM, PRGM 0, PRGM 1, PRGM 2, PRGM 3). Result: One beep indicates the button is disabled. Three beeps indicate the button in enabled. Place the SPARE jumper back into the SPARE position of the Test Points header P17.
Handpiece lockout	Plumb a normally open air-electric switch (kit P/N 61.1384.00) to the air-coolant tubing (green with long white dashes). Insert the two position connector from the air-electric switch into P13 Lockout (next to the transformer)
Diagnostic LEDs	See *Diagnostic LEDs for the Circuit Board*.
Test Points Header	Use a SPARE jumper to test the chair manual functions (BKUP, BSUP, BSDN, BKDN). BK POT and BS POT points allow test meter check of potentiometer voltages and measurement of the analog DC voltage from pin 2 of the potentiometer.

Item #	Part Number	Description
1	61.3043.00	8-button footswitch
2	041.372.00	Back positioning potentiometer
3	041.372.00	Base positioning potentiometer
4	61.2065.00	Back up limit switch
5	044.184.01	Base up limit switch



Item #	Part Number	Description
1	 61.1332.00 61.1333.00 61.1334.00	Hydraulic manifold with 100V, Yellow wires 120 V, Black wires 240 V, Red wires
2	90.1031.00 90.1034.00	Capacitor with boot (100-120V) Capacitor with boot (240V)



Fuse Table for Old-style Circuit Boards (no LEDs)

Actual Size

Slo-Blo Fuses 3AG, 1 1/4" X 1/4" (31.75mm X 6.35mm)

Amps	Description	Where used	Part Number
.125	3AG, Slo-Blo, 250V	Chairs, 100/120V	041.360.00
.150	3AG, Slo-Blo, 250V	Chairs, 240V	046.126.00
.300	3AG, Slo-Blo, 250V	1040, 1030 Chairs 100/120V 1010/1015/1020/1021 Chair, 120V 1010/1020 Chair, 100V 1005 Priority Chair 240V	046.069.00
.375	3AG, Slo-Blo, 250V	Transformer 120V/24V Accessory	046.021.00
.600	3AG, Slo-Blo, 250V	1005 Priority Chair 100/120V	046.070.00
5.0	3AG, Slo-Blo, 250V	Chairs 240V UK	046.100.00

Actual Size

Time Lag Fuses, 5mm X 20mm (1/5" X 3/4")

Amps	Description	Where used	Part Number
.040	Time Lag, 250V	Chairs 230V*	044.194.00
.063	Time Lag, 250V	Chairs 115V*	044.193.00
6.30	Time Lag, 250V	Chairs 230V*	044.147.00
10.0	Time Lag, 250V	Chairs 115V*	044.192.00

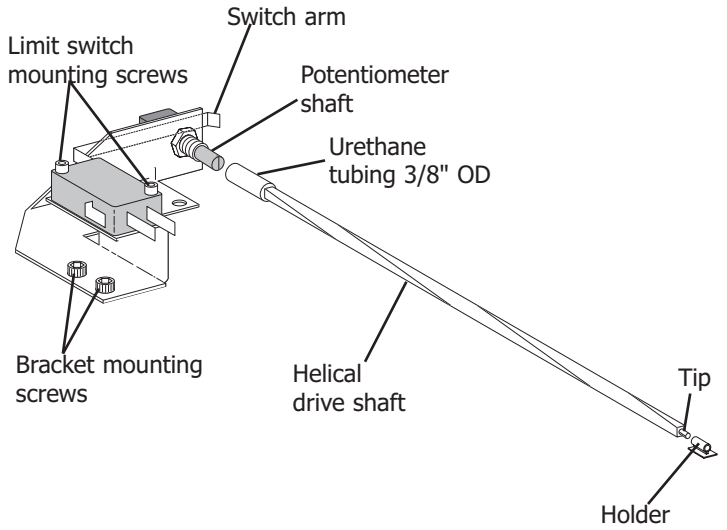
*Decade chairs after E863254; Cascade chairs after E863116

NOTE: There are no replaceable fuses on the following circuit boards: 90.1029.00 (100-120V) and 90.1029.01 (220-240V).

Removing the Helical Drive Shaft (Cascade 1040 Chair)

Follow these steps to remove the limit switch and the helical drive shaft from the potentiometer shaft.

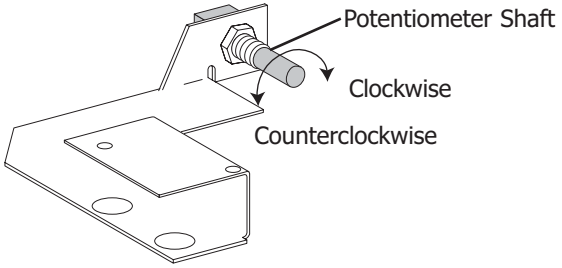
Task	Description
1	Position the chair back full down and remove the seat upholstery.
2	Disconnect the limit switch wiring harness from the limit switch.
3	Remove the limit switch mounting screws and limit switch from the bracket. Lower the toeboard, if necessary, to access the rear mounting screw. Do not bend the switch arm.
4	Remove the bracket mounting screws.
5	Remove the helical drive shaft from the potentiometer shaft. While holding the helical shaft, reach underneath the chair to th base of the backrest. Grasp the bracket and pull it away from the helical shaft.
6	Remove the helical drive shaft from the chair by moving it toward the chair backrest and then slightly to the side to dislodge it from the holder and guide.



Cascade 1040 Back Positioning Potentiometer and Limit Switch

Adjusting the Potentiometer (Cascade 1040 Chair)

Turn the potentiometer shaft counterclockwise until it will no longer turn. Then turn the shaft clockwise 1/8 of a turn.



Setting the Back Potentiometer on the Cascade 1040 Chair

Reinstalling the Helical Drive Shaft (Cascade 1040 Chair)

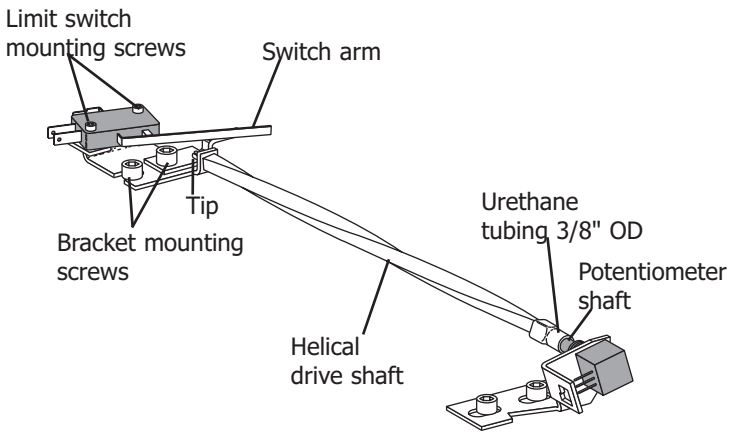
Follow these steps to reinstall the back positioning potentiometer helical shaft and adjust the limit switch.

Task	Description
1	Reinstall the helical drive shaft by fully inserting the tip through the guide and into the holder.
2	Install the helical shaft onto the potentiometer shaft.
3	Reinstall the mounting screws, being careful not to pinch any wires.
4	Reinstall the limit switch on the bracket and reconnect it with the wiring harness.
5	Ensure the positioning potentiometer electrical connections are complete.
6	Reprogram the auto-positioning functions (refer to *Programming the Chair*).
7	Reinstall the upholstery.

Removing the Helical Drive Shaft (Decade 1011/1021 Chairs)

Follow these steps to remove the limit switch and helical drive shaft from the chair.

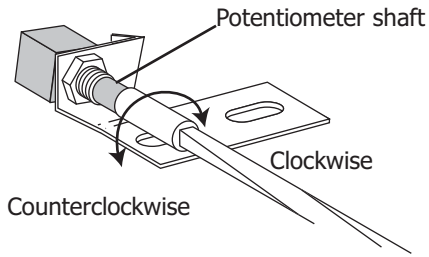
Task	Description
1	Position the chair back full up and remove the seat upholstery.
2	Disconnect the limit switch wiring harness from the limit switch.
3	Remove the limit switch mounting screws and limit switch from the bracket. Do not bend the switch arm.
4	Remove the bracket mounting screws.
5	Remove the helical drive shaft from the potentiometer shaft. While holding the helical shaft, reach underneath the chair to the base of the backrest. Grasp the bracket and pull away from the helical shaft.
6	Remove the helical drive shaft from the chair by moving it toward the chair backrest and then slightly to the side to dislodge it from the holder and guide.



Decade 1011/1021 Back Positioning Potentiometer and Limit Switch

Adjusting the Potentiometer (Decade 1011/1021 Chairs)

Turn the potentiometer shaft clockwise until it will no longer turn. Then turn the shaft counterclockwise 1/8 of a turn.



Setting the Back Potentiometer on the Decade 1011/1021 Chair

Reinstalling the Helical Shaft (Decade 1011/1021 Chairs)

Follow these steps to reinstall the back positioning potentiometer helical shaft and to reposition the limit switch.

Task	Description
1	Reinstall the helical drive shaft by fully inserting the tip through the guide and into the holder.
2	Install the helical shaft onto the potentiometer shaft.
3	Reinstall the mounting screws, being careful not to pinch any wires.
4	Reinstall the limit switch on the bracket and reconnect it with the wiring harness.
5	Ensure the positioning potentiometer electrical connections are complete.
6	Reprogram the auto-positioning functions (refer to *Programming the Chair*).
7	Reinstall the upholstery.

Working with the Back and Base Positioning Potentiometers

The back and base positioning potentiometers (pots) perform two tasks for the controller:

- Provide the controller with a voltage level representing the current position of the chair base and back. The voltage level is stored by the controller for later reference during auto-positioning.
- Tell the controller where the chair base and back are currently positioned. The controller compares the current voltage level to the voltage level stored during auto-positioning programming.

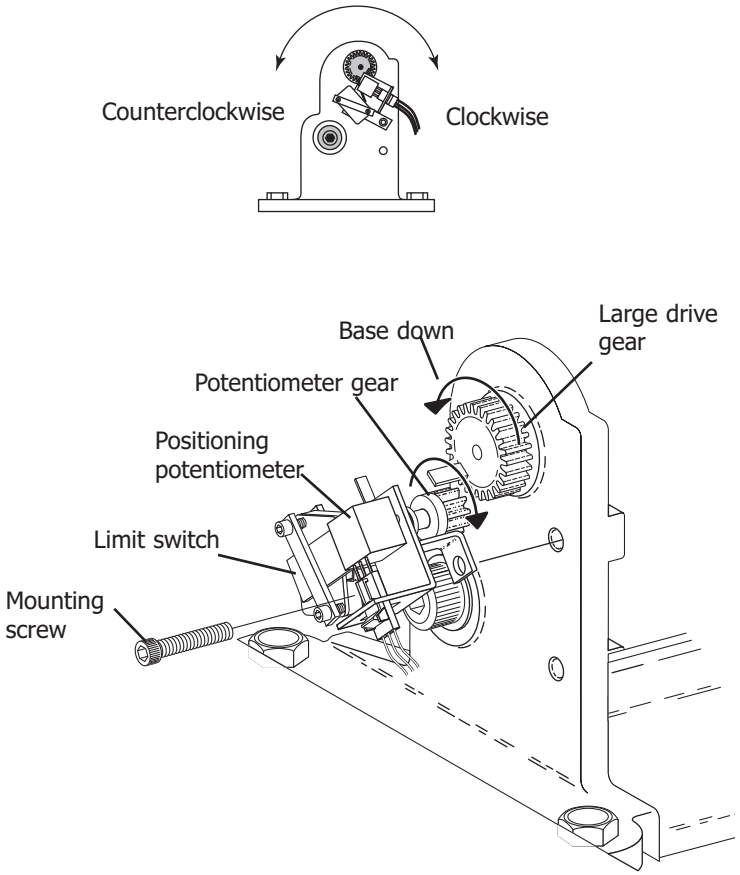
The base positioning pot is gear-driven by movement of the chair lift arm. The back positioning pot is driven by movement of the chair back.

Adjusting the Base Positioning Potentiometer

Follow these steps to adjust the base positioning potentiometer.

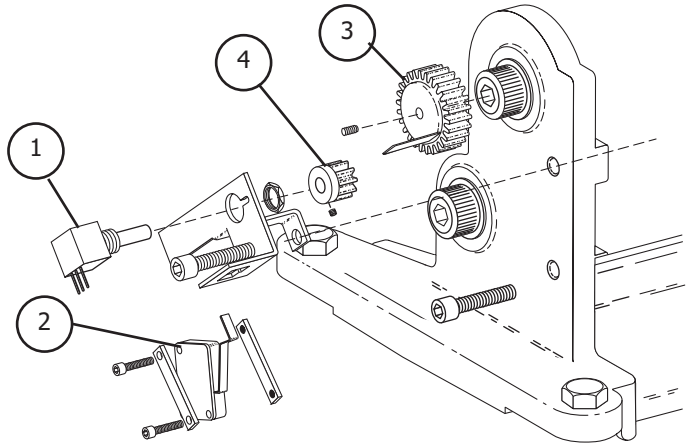
Task	Description
1	Remove the motor/pump cover and position the chair base down.
2	Remove the mounting screw.
3	Turn the potentiometer gear clockwise until it stops.
4	Align the potentiometer assembly, then turn the potentiometer gear counterclockwise two teeth (relative to one tooth on the large drive gear).
5	Ensure all electrical connections to the limit switch and positioning potentiometer are properly connected
6	Raise the chair base while observing the two gears for binding.
7	Reinstall the motor/pump cover and reprogram the pre-positioning functions.

NOTE: Do not raise the base to full up until you have adjusted the base up limit switch (see Adjusting the Base Up Limit Switch).



Adjusting the Base Positioning Potentiometer

Base Positoning Potentiometer



Replacing Base Positioning Potentiometer, Limit Switch and Gears

Item #	Part Number	Description
1	041.372.00	Potentiometer w/nut 5K ohm, +20%, 1W
2	044.184.01	Limit switch, modified
3	61.1295.00	Gear, 24 pitch 30 tooth
4	61.1222.00	Potentiometer gear

Working with the Back Up and Base Up Limit Switches

The chair base and back up limit switches detect when the maximum allowed up travel is reached. The two limit switches are normally closed enabling the base and back up relay circuits. If an up limit switch is opened, two things occur:

- The base or back up function relay is disabled causing the up function solenoid to shut off the flow of hydraulic fluid to the cylinder.
- The controller, sensing that a back up or base up relay has been disabled, turns off the hydraulic pump.

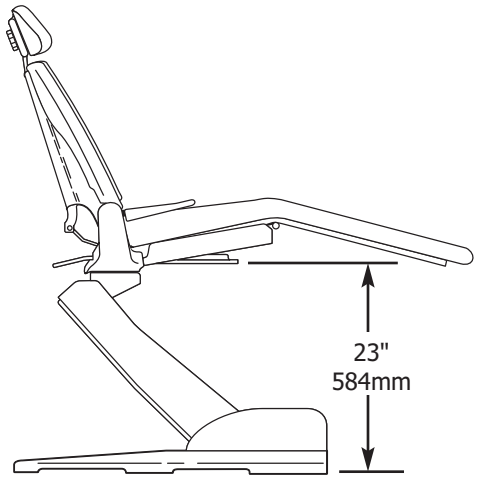
The base up limit switch is actuated by a pin located on the positioning potentiometer drive gear. The back up limit switch is actuated by a glide block, which is part of the back tilt mechanism.

Adjusting the Base Up Limit Switch

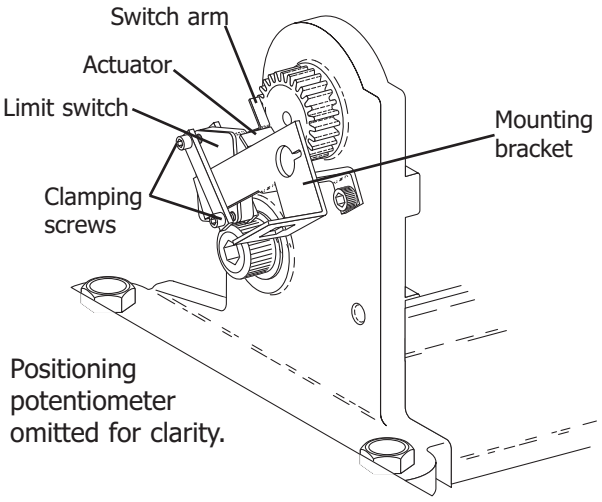
Follow these steps for adjusting the base up limit switch.

NOTE: For correct limit switch actuation, the actuator tab on the large gear should be at approximately the 5:30 clock position when the chair is full base down.

Task	Description
1	Remove the motor/pump cover.
2	Loosen the two screws clamping the limit switch to the mounting bracket.
3	Position the chair base up until the distance from the floor to the base of the upper chair casting is 23" (584mm).
4	Push the limit switch against the actuator on the drive gear until the switch opens (clicks).
5	Tighten the clamping screws, making sure they do not hit the gear.
6	Lower the chair base down until the limit switch has closed, then raise the chair full base up. Check the distance between from the floor to the base of the upper chair casting to ensure it is 23" (584mm).



Raising the Chair to the Correct Base Up Height



NOTE: Positioning potentiometer omitted for clarity.

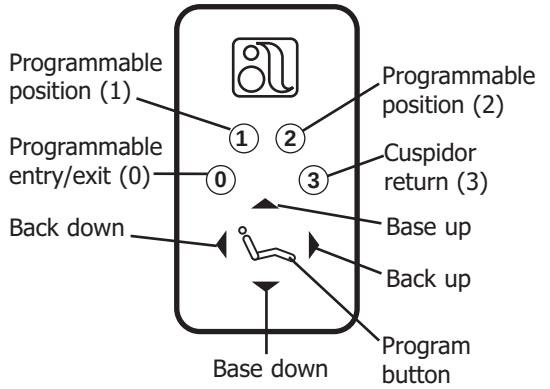
Adjusting the Base Up Limit Switch

Programming the Chair

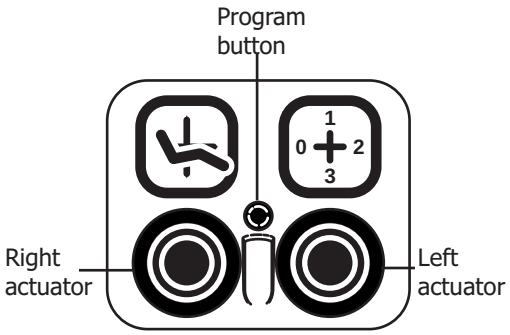
Follow these steps to set the auto-positioning for the chair.

Task	Description
1	Use the footswitch or touchpad to set the chair at the desired position for base and back.
2	Press and release the program button. Result: You will hear a single beep.
3	Within four seconds, press an automatic position button (0, 1, 2, or 3) on the footswitch or touchpad to store the chair position. On an 8-function footswitch, move the actuator to the desired position. Result: You will hear three beeps confirming that the function has been programmed.

NOTE: PCBs manufactured before 1994, do not beep. Test the programming by trying it.

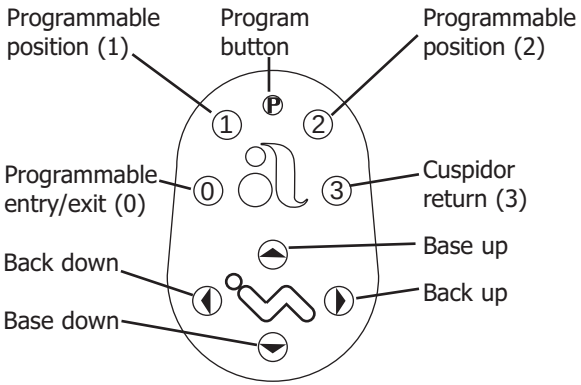


Chair Touchpad



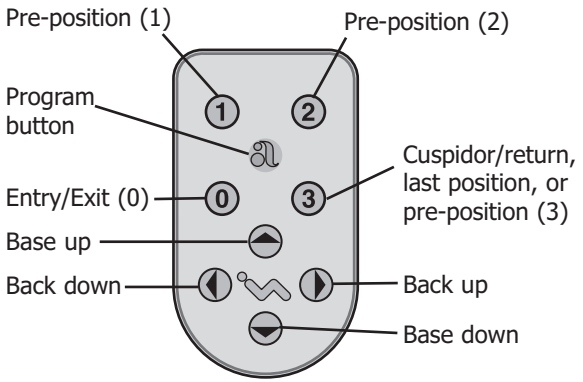
8-Function Footswitch

Replacement membrane P/N 61.2189.00



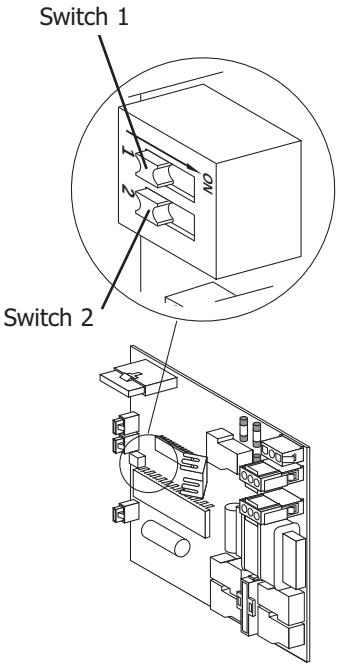
8-Button Footswitch

Replacement membrane P/N 61.3048.00



Performer III Touchpad

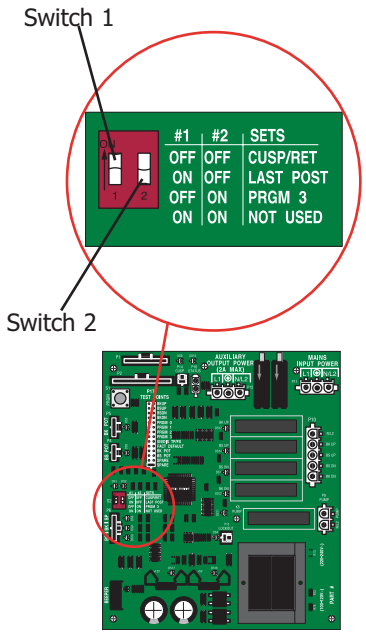
Programming Function 3



Function 3 DIP Switch before 2000

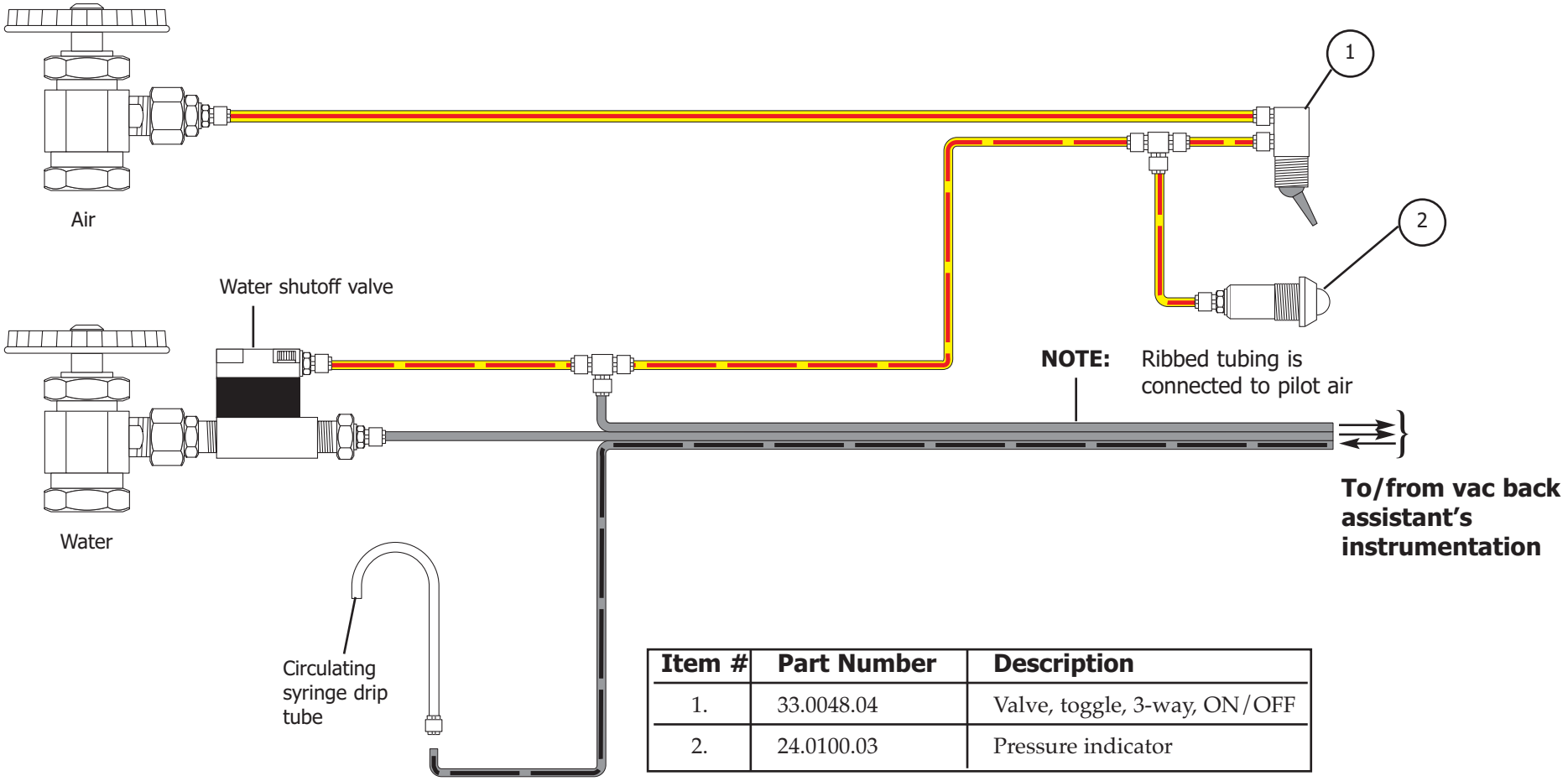
Function	Description	Programming
Cuspidor/Return **NOTE:** Chairs with S/N J467728 and later are factory set with function 3 as cuspidor/return	Used to raise the chair back to a programmable upright position providing the patient access to the cuspidor. Momentarily pushing button 3 on the touchpad or 8-button footswitch, or moving the actuator to position three on the 8-function footswitch, returns the back to the previous position.	Switches 1 and 2 are OFF.
Last Position	A non-programmable position that simply moves the chair base and back to their previous positions.	Switch 1 is ON and switch 2 is OFF. Go back and forth between two positions by momentarily moving the righthand actuator on the 8-function footswitch to position 3 or pressing number 3 on the touchpad or 8-button footswitch.
Programmable Position **NOTE:** Chairs up to S/N J467727 are factory set with function 3 as a programmable position	This option is used to set the base and back to a predesignated position. It allows this function to be programmed like 0, 1, and 2.	Switch 1 is OFF and switch 2 is ON. Move the chair to the desired position. Press and release the program button. After the beep, push button 3 on the touchpad or 8-button footswitch or move the actuator to position 3 on the 8-function footswitch. The single beep confirms the position is programmed.

Programming Function 3



Function 3 DIP Switch after 2000

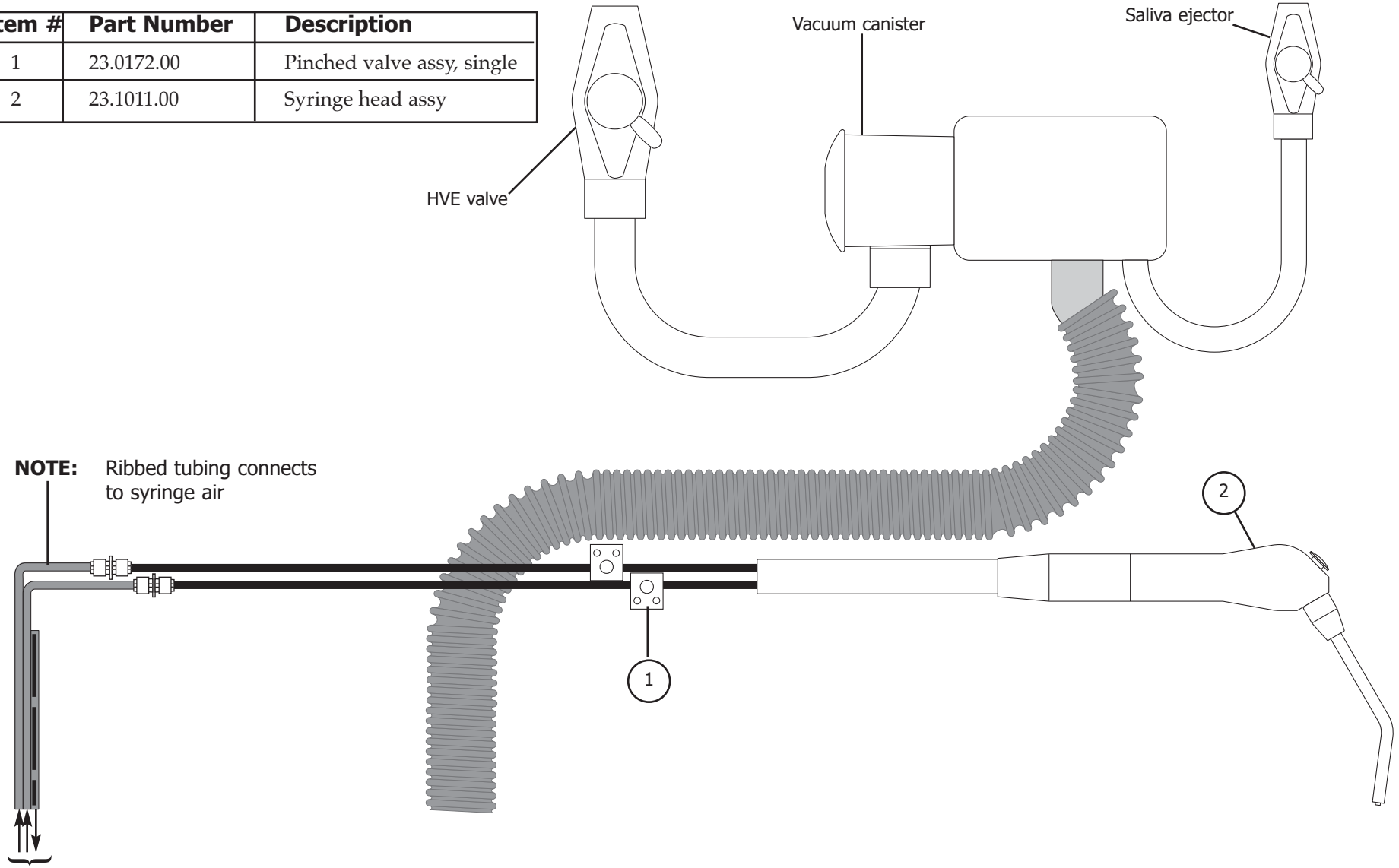
Function	Description	Programming
Cuspidor/Return	Used to raise the chair back to a programmable upright position providing the patient access to the cuspidor. Momentarily pushing button 3 on the touchpad or 8-button footswitch, or the actuator to position 3 on the 8-function footswitch will return the back to the previous position.	Both switches 1 and 2 are OFF.
Last Position	A non-programmable position that simply moves the chair base and back to their previous positions.	Switch 1 is ON and switch 2 is OFF. Go back and forth between two positions by momentarily pushing the right hand rocker button to position 3 or pressing number 3 on the touchpad.
Programmable Position	Used to set the base and back to a predesignated position.	Switch 1 is OFF and switch 2 is ON. Move the chair to the desired position. Press and release the program button. After the tone, push button 3 on the touchpad or footswitch or move the actuator to position 3 on the 8-function footswitch. The audible tone confirms the position is programmed.



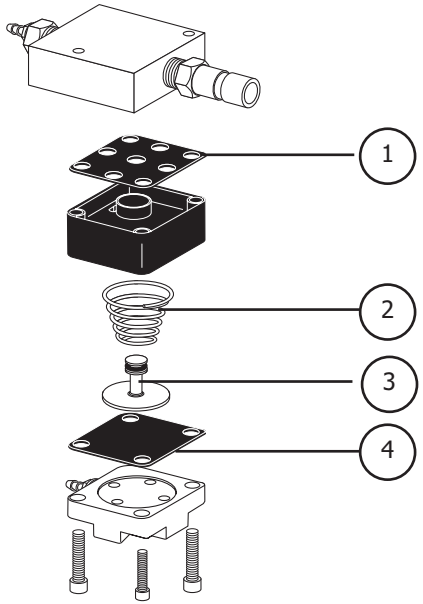
Item #	Part Number	Description
1.	33.0048.04	Valve, toggle, 3-way, ON/OFF
2.	24.0100.03	Pressure indicator

Cascade 1040 Vac Back Assistant's Instrumentation

Item #	Part Number	Description
1	23.0172.00	Pinched valve assy, single
2	23.1011.00	Syringe head assy

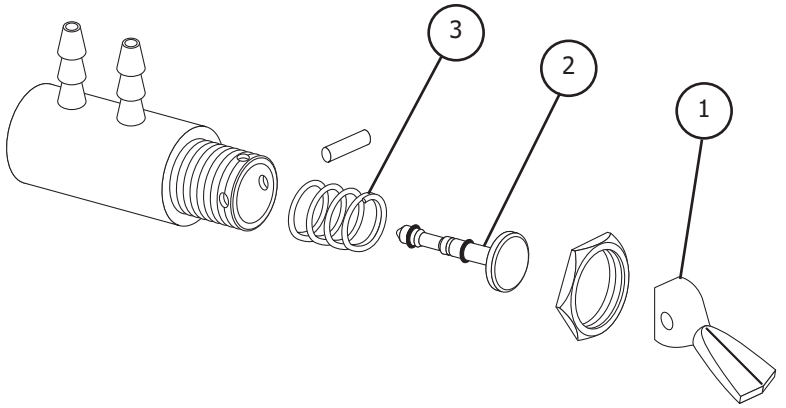


Water Shutoff Valve and 3-way Toggle Valve



Water Shutoff Valve
34.0031.00

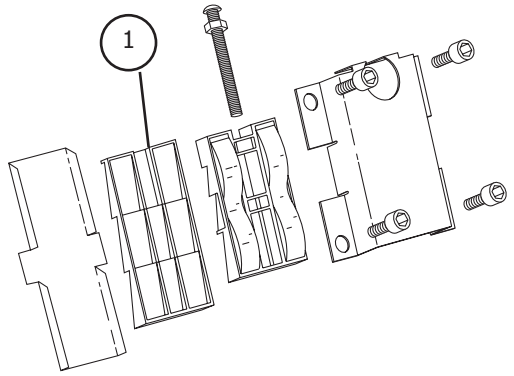
Item #	Part Number	Description
1	24.0137.01	9-hole gasket, pkg 10
2	013.032.00	Spring, conc, comp, .260/.350 OD
3	24.0132.00	Piston with O-ring, Delrin
4	24.0440.02	Diaphragm, pkg 10



3-Way Toggle Valve
33.0048.04

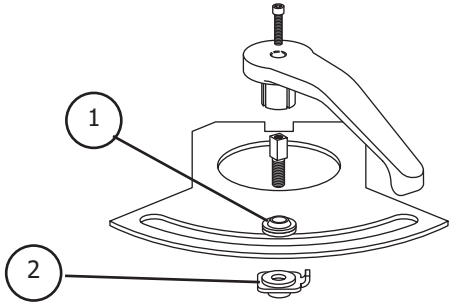
Item #	Part Number	Description
1	33.0031.01	Toggle with pin, Gray
2	29.0840.00	Stem with O-rings, 3-way
3	22.0040.00	Spring, comp., .300 OD x .40

Cascade 1040 Glide Bar Tension Block



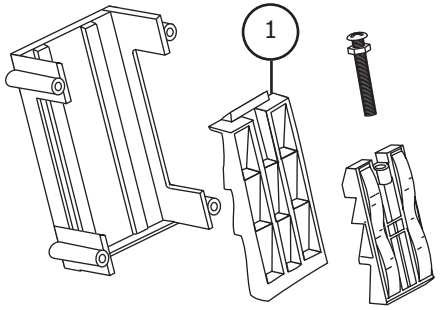
Item #	Part Number	Description
1	61.1569.00	Wearpad, sliding wedge

Cascade 1040 Swivel Brake 61.2055.00



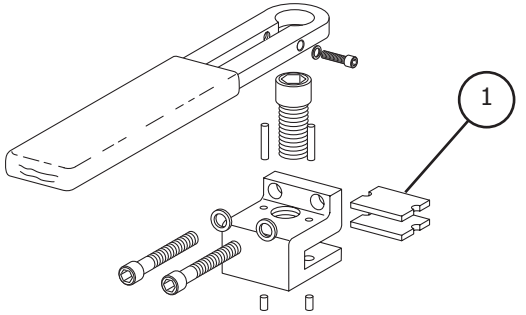
Item #	Part Number	Description
1	61.1228.00	Thrust washer-brake pad assy
2	61.2227.00	Nut-brake pad assy

Decade 1011/1021 Glide Bar Tension Block



Item #	Part Number	Description
1	61.1569.00	Wearpad, sliding wedge

Decade 1011/1021 Swivel Brake 61.1538.01



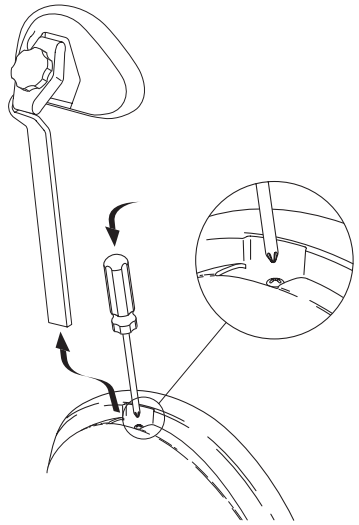
Item #	Part Number	Description
1	61.1537.01	Replacement brake pads

Adjusting the Double-Articulating Headrest

Follow these steps to adjust the headrest.

Task	Description
1	Adjust the glide bar until the headrest moves freely yet maintains its position.
2	Turn the screw clockwise to increase friction and hold the headrest more securely.
3	Turn the screw counterclockwise to decrease friction and allow the headrest to move up and down more freely. The Decade chair adjustment screw is located in back of the glide bar.

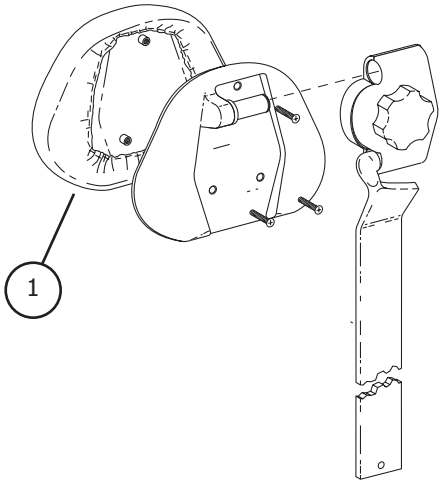
NOTE: Use a phillips head screwdriver to adjust the glide bar tension. You may need to remove the back upholstery to access the adjustment screw.



Adjust Cascade 1040 Headrest Glide Bar Tension

Upholstery Replacement

Item #	Part Number	Description
1	61.2116.XX	Double articulating headrest upholstery
—	61.3046.00	Conversion kit, 1040 screw-on headrest cushion. Applies to chairs with the wire formed headrest cushion (S/N E442969 and before).



Double-Articulating Headrest 61.2265.00

Troubleshooting PCBs with no LEDs

Diagnostic information is presented in the following charts.

Problem	Action
Chair is inoperative	1 Do any relays on the printed circuit board click? Refer to *Testing Relay Click*. YES: Go to step 2. NO: Go to step 3. 2 Is the base/back all the way down? YES: Go to *Base or Back Up Function is Inoperative*. NO: Go to step 3. 3 Has the solenoid fuse blown (120V only)? YES: Replace the fuse. Check for shorted solenoids or shorted wiring to the solenoids (refer to *Testing Solenoid Continuity and Testing Wiring Harness Continuity*). Retest chair functions. NO: Go to step 4. 4 Complete the steps outlined in *Testing Magnetic Pull*. Is there magnetic pull at each solenoid? YES: Go to step 5. NO: Remove and replace the faulty solenoid (refer to *Removing a Solenoid* and *Replacing a Solenoid*). Retest chair functions. 5 Is the chair in hydrostatic lock? YES: Remedy hydrostatic lock (refer to *Correcting Hydrostatic Lock*). Retest chair functions. NO: Check for and replace a faulty manifold or valve.

Problem	Action
Chair is inoperative	6 Is the printed circuit board fuse(s) blown? YES: Remove and replace the fuse, then check the potentiometer wiring for damage, shorts, or improper wiring. If the fuse blows again, disconnect the potentiometer wiring at P4 and P5 on the printed circuit board. If the fuse still blows, remove and replace the printed circuit board. Otherwise remove and replace the potentiometer wiring. NO: Check the condition of the stop plate limit switches and wiring. Check the printed circuit board connector P6 (limit switches). Unplug the chair from its power outlet and plug it in again. If the chair is still inoperative, make sure there is power at the outlet. If the preceding steps do not solve the problem, go to step 7. 7 Disconnect the footswitch and, if installed, the touchpad. Use the printed circuit board test points to activate chair up functions (refer to *Using Chair Test Points*). Does the chair work now? YES: If there is a footswitch only, remove and replace the footswitch. If there is a touchpad only, remove and replace the touchpad. If there is both a footswitch and touchpad, go to step 8. NO: The printed circuit board is faulty, remove and replace the printed circuit board. 8 Reconnect the footswitch to the printed circuit board. Using the footswitch, operate the chair. Does the chair work properly? YES: Remove and replace the touchpad. NO: Go to step 9. 9 Reconnect the touchpad to the printed circuit board. Using the touchpad, operate the chair. Does the chair work properly? YES: Remove and replace the footswitch. NO: The printed circuit board is faulty, remove and replace the printed circuit board.

Problem	Action
Base or back up function is inoperative	1 Is the chair base or back up? YES: Go to step 2. NO: Go to step 3. 2 Has the up limit switch activated (opened)? Refer to *Testing Limit Switch Continuity* and *Testing Limit and Stop Switches Voltage*. YES: Normal chair operation, check base up limit switch adjustment (refer to *Adjusting the Base Up Limit Switch*). The back up limit switch is not adjustable. NO: The chair may be in hydraulic lock. Remedy the hydrostatic lock (refer to *Correcting Hydrostatic Lock*). 3 Has the solenoid fuse blown (120V only)? YES: Replace the fuse. Complete *Testing Solenoid Continuity*. Replace shorted solenoids or shorted wiring to the solenoids, as necessary. NO: Go to step 4. 4 Is the motor/pump hot? YES: Wait 20 minutes for the thermal limiter to reset. If the Up function works, check for other problems. If the Up function is still inoperative, go to step 5. NO: Go to step 5. 5 Does a relay on the printed circuit board click (refer to *Testing Relay Click*)? YES: Go to step 6. NO: Go to step 7. 6 Complete the steps outlined in *Testing Magnetic Pull*. Is there magnetic pull at the solenoid? YES: Go to step 12. NO: The solenoid is faulty. Remove and replace the solenoid (refer to *Removing a Solenoid* and *Replacing a Solenoid*).

Problem	Action
Base or back up function is inoperative	7 Disconnect the footswitch and, if installed, the touchpad. Use the printed circuit board test points to activate chair up function (refer to *Using Chair Test Points*). Does a relay on the printed circuit board click (refer to *Testing Relay Click*)? YES: Go to step 8. NO: Go to step 10. 8 Does the UP function work? YES: If there is a footswitch only, remove and replace the footswitch. If there is a touchpad only, remove and replace the touchpad. If there is both a footswitch and touchpad, go to step 9. NO: Go to step 11. 9 Reconnect the footswitch to the printed circuit board. Using the footswitch, operate the chair. Does the UP function work? YES: Remove and replace the touchpad. NO: Go to step 10. 10 Reconnect the touchpad to the printed circuit board. Using the touchpad, operate the chair. Does the UP function work? YES: Remove and replace the footswitch. NO: Go to step 11. 11 Complete the steps for *Testing Magnetic Pull*. Is there magnetic pull at the solenoid? YES: Go to step 14. NO: Remove and replace the faulty solenoid(s) (refer to *Removing a Solenoid* and *Replacing a Solenoid*).

Problem	Action
Base or back up function is inoperative	12 Is the limit switch faulty or open (refer to *Testing Limit Switch Continuity* and *Testing Limit and Stop Switches Voltage*)? YES: Adjust or remove and replace the limit switch. Adjust the base up limit switch (refer to *Adjusting the Base Up Limit Switch*). NO: Go to step 13. 13 Is the limit switch wiring faulty (refer to *Testing Wiring Harness Continuity*)? YES: Repair or replace the limit switch wiring. NO: Unplug the chair and plug it back in. If the problem remains, the printed circuit board is faulty, replace the printed circuit board. 14 Is there an open in the limit switch wiring (*refer to Testing Wiring Harness Continuity*)? YES: Repair or replace the wiring. NO: Go to step 15. 15 Is the base up limit switch out of adjustment? YES: Adjust the limit switch (refer to *Adjusting the Base Up Limit Switch*). The back up limit switch is not adjustable. NO: Go to step 16. 16 Is there noise from the motor/pump? YES: Go to step 17. NO: Go to step 18.

Problem	Action
Base or back up function is inoperative	17 Is the motor current more than 5 Amps (refer to *Testing the Motor/Pump*)? YES: The motor/pump is faulty. Remove and replace the motor/pump. NO: Remove and replace the motor/pump capacitor. Test the Up function. If it still does not work,the manifold is faulty. Remove and replace it. 18 Is there an open or short in the motor/capacitor wiring (refer to *Testing Wiring Harness Continuity*)? YES: Contact an A-dec customer service representative for proper repair procedures of the motor/pump capacitor wiring. NO: The printed circuit board is faulty, remove and replace the printed circuit board.
Base or back down function is inoperative	1 Try an Up function first, then a Down function. Is the base or back still up? YES: Go to step 2. NO: Go to step 3. 2 Has the limit switch activated (opened) (refer to *Testing Limit Switch Continuity* and *Testing Limit and Stop Switches Voltage*)? YES: Go to step 3. NO: The chair may be in hydrostatic lock. Remedy hydrostatic lock (refer to *Correcting Hydrostatic Lock*). Retest chair functions. 3 Does a relay on the printed circuit board click (refer to *Testing Relay Click*)? YES: Go to step 7. NO: Go to step 4.

Problem	Action
Base or back down function is inoperative	4 Disconnect the footswitch and, if installed, the touchpad. Use the printed circuit board test points to activate chair down functions (refer to *Using Chair Test Points*). Does the down function work? YES: If there is a footswitch only, remove and replace the footswitch. If there is a touchpad only, remove and replace the touchpad. If there is both a footswitch and touchpad, go to step 5. NO: Check condition of stop and/or cuspidor limit switches and wiring (refer to *Testing Limit and Stop Switches Voltage*, *Testing Limit Switch Continuity*, and *Testing Wiring Harness Continuity*). Check the printed circuit board connector P6 (limit switches). Unplug the chair and plug it back in. If the problem remains, the printed circuit board is faulty. Replace the printed circuit board. 5 Reconnect the footswitch to the printed circuit board. Using the footswitch, operate the chair. Does the chair down function work? YES: Remove and replace the touchpad. NO: Go to step 6. 6 Reconnect the touchpad to the printed circuit board. Using the touchpad, operate the chair. Does the chair down function work? YES: Remove and replace the footswitch. NO: Check condition of stop switch and/or cuspidor limit switch and wiring (refer to *Testing Limit and Stop Switches Voltage*, *Testing Limit Switch Continuity*, and *Testing Wiring Harness Continuity*). Check the printed circuit board connector P6 (limit switches). Unplug the chair and plug it back in. If the problem remains, the printed circuit board is faulty. Replace the printed circuit board. 7 Complete the steps for *Testing Magnetic Pull*. Is there magnetic pull at each solenoid? YES: Replace faulty manifold/valve. NO: Go to step 8. 8 Has the solenoid fuse blown (120V only)? YES: Replace the fuse. Complete the steps for *Testing Solenoid Continuity*. Replace shorted solenoids or shorted wiring to the solenoids as necessary. NO: Replace the faulty solenoid.

Problem	Action
Back moves for base only function or base moves for back only function	1 Disconnect the footswitch and, if installed, the touchpad. Use the printed circuit board test points to activate chair functions (refer to *Using the Chair Test Points*). Does the chair work properly now? YES: If there is a footswitch only, remove and replace the footswitch. If there is a touchpad only, remove and replace the touchpad. If there is both a footswitch and touchpad, go to step 2. NO: The printed circuit board is faulty. Replace the printed circuit board. 2 Reconnect the footswitch to the printed circuit board. Using the footswitch, operate the chair. Does the chair work properly? YES: Remove and replace the touchpad. NO: Go to step 3. 3 Reconnect the touchpad to the printed circuit board. Using the touchpad, operate the chair. Does the chair work properly? YES: Remove and replace the footswitch. NO: The printed circuit board is faulty. Remove and replace the printed circuit board.
Only chair function is base up	1 Are the stop plate limit switches activated? YES: Go to step 2. NO: Go to step 3. 2 Is the stop plate stuck? YES: Remove obstruction from the stop plate. NO: Go to step 3. 3 Check the connections and the limit switches (refer to *Testing Limit and Stop Switches Voltage*, *Testing Limit Switch Continuity*, and *Testing Wiring Harness Continuity*). Are wire connections or limits switches faulty? YES: Repair or replace components, as necessary. NO: Go to step 4.

Problem	Action
Only chair function is base up	4 If there is a cuspidor, check for proper activation of the limit switch when gently lifting up on the cuspidor bowl. Is there a clicking sound? YES: Go to step 5. NO: Replace the switch (refer to *Post Boxes and Cuspidors (PB)* for the part number). 5 Disconnect the 2-pin connector at P14 on the printed circuit board. Gently short across P14 with a small flat-blade screwdriver. Does the chair operate correctly? YES: Replace the cuspidor cable (P/N 41.1148.00). NO: Replace the printed circuit board.
Unable to program auto-positioning	1 Review auto-positioning procedures (refer to *Programming the Chair*). Does the chair move when you try to program it? YES: Check for shorted wires at footswitch connector P2, and at touchpad connector P1, if installed, on the printed circuit board (refer to *Testing Wiring Harness Continuity*). NO: Go to step 2. 2 Does the chair move to the wrong position? YES: Go to *Incomplete auto-positioning cycle*. NO: Go to step 3. 3 Disconnect the footswitch and, if installed, the touchpad. Use the printed circuit board test points to program the chair (refer to *Using Chair Test Points*). Did the chair program satisfactorily? YES: If there is a footswitch only, remove and replace the footswitch. If there is a touchpad only, remove and replace the touchpad. If there are both a footswitch and touchpad, go to step 7. NO: Go to step 6. 4 Reconnect the footswitch to the printed circuit board. Using the footswitch, program the chair. Did the chair program satisfactorily? YES: Remove and replace the touchpad. NO: Go to step 5.

Problem	Action
Unable to program auto-positioning	5 Reconnect the touchpad to the printed circuit board. Using the touchpad, program the chair. Did the chair program satisfactorily? YES: Remove and replace the footswitch. NO: Go to step 6. 6 Is there an open or short in the positioning potentiometer wiring (refer to *Testing Wiring Harness Continuity*)? YES: Repair positioning potentiometer wiring. NO: Go to step 7. 7 Are there any poor or reversed potentiometer connections (refer to *Testing Positioning Potentiometer Voltage*)? YES: Repair positioning potentiometer connections. NO: The printed circuit board is faulty. Replace the printed circuit board.
Unable to program auto-positioning for the touchpad and footswitch	1 Disconnect the footswitch and try to operate the automatic functions from the touchpad. Does the touchpad work properly? YES: Replace the footswitch. NO: Go to step 2. 2 Plug the footswitch back in and disconnect the touchpad. Try to operate the automatic functions from the foot control. Does the footswitch work properly? YES: Replace the touchpad. NO: Call your A-dec customer service representative for assistance.

Problem	Action
Incomplete auto-positioning cycle	1 Has a new printed circuit board been installed? YES: Reprogram the chair printed circuit board. NO: Go to step 2. 2 Has a new potentiometer been installed? YES: Verify that the positioning potentiometer has been installed correctly and that positions have been properly programmed. NO: Go to step 3. 3 Does base or back travel time exceed 40–45 seconds? YES: Adjust the manifold speed control valves (refer to *Adjusting the Hydraulic Manifold*). NO: Go to step 4. 4 Is the back stopping short of full upright? YES: Positioning potentiometer is defective or in deadband. Adjust the potentiometer (refer to *Adjusting the Base Positioning Potentiometer*). NO: Go to step 5. 5 Does the base or back only go in one direction? YES: Check for faulty positioning potentiometers, wiring, and connections. NO: Go to step 6. 6 Does the base or back go in the wrong direction? YES: Go to step 7. NO: Go to step 8. 7 Is the potentiometer mechanical drive slipping? YES: Tighten the gear setscrew, or replace the connecting tubing, and then adjust the potentiometer (refer to *Adjusting the Base Positioning Potentiometer*). NO: Go to step 8.

Problem	Action
Incomplete auto-positioning cycle	8 Does the base or back shut off at the same time? YES: The printed circuit board is faulty. Replace the printed circuit board. NO: Go to step 9. 9 Is the potentiometer resistance 0–5K ± 20% ohm (Ω)? Refer to *Testing Positioning Potentiometer Continuity*, *Testing Wiring Harness Continuity*, and *Testing Base and Back Positioning Potentiometer Voltage.* YES: Go to step 10. NO: Positioning potentiometer is faulty. Replace the potentiometer. 10 Are the potentiometer wiring and connections equal to 0Ω (refer to *Testing Positioning Potentiometer Continuity, Testing Wiring Harness Continuity and Testing Base and Back Positioning Potentiometer Voltage*)? YES: Go to step 11. NO: Repair or replace the wiring and connections. 11 Is the potentiometer mechanical drive slipping? YES: Tighten the gear setscrew, or replace the connecting tubing, and then adjust the potentiometer. NO: Go to step 12. 12 Are the potentiometers turning? YES: The printed circuit board is faulty. Replace the printed circuit board. NO: Check for a loose or damaged potentiometer mount or improper adjustment (refer to *Adjusting the Base Positioning Potentiometer* and *Adjusting the Base Up Limit Switch*).

Problem	Action
Auto-positioning function is inoperative	1 Reprogram the chair auto-positioning settings (refer to *Programming the Chair*). Does the chair go to the wrong position? YES: Go to *Incomplete auto-positioning cycle*. NO: Go to step 2. 2 Disconnect the footswitch and, if installed, the touchpad. Use the printed circuit board test points to activate chair auto functions (refer to *Using Chair Test Points*). Does the chair function properly? YES: If there is a footswitch only, remove and replace the footswitch. If there is a touchpad only, remove and replace the touchpad. If there is both a footswitch and touchpad, go to step 3. NO: Unplug the chair and plug it back in. If the problem remains, the printed circuit board is faulty. Replace the printed circuit board 3 Reconnect the footswitch to the printed circuit board. Using the footswitch, operate the chair. Does the chair work properly now? YES: Remove and replace the touchpad. NO: Go to step 4. 4 Reconnect the touchpad to the printed circuit board. Using the touchpad, operate the chair. Does the chair work properly now? YES: Remove and replace the footswitch. NO: Unplug the chair and plug it back in. If the problem remains, the printed circuit board is faulty, remove and replace the printed circuit board.

Problem	Action
Auto-positioning for one or more functions is inoperative on a unit with both a footswitch and a touchpad	1 Unplug the footswitch and try to operate the automatic functions from the touchpad. Does the touchpad work properly? YES: Replace the footswitch. NO: Go to step 2. 2 Plug the footswitch back in and disconnect the touchpad. Try to operate the automatic functions from the foot control. Does the footswitch work properly? YES: Replace the touchpad. NO: The printed circuit board is faulty. Replace the printed circuit board.

Using Chair Test Points

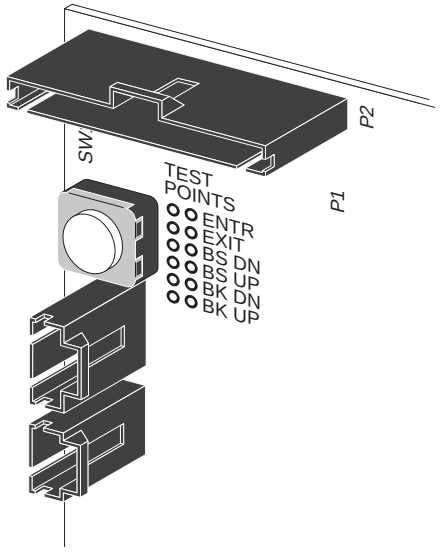
WARNING

Hazardous AC voltages are present on the printed circuit board. Do not touch any part on the printed circuit board except the test points.

- The chair test points are used to test chair function without a footswitch connected to the printed circuit board.
- To access the test points, you must remove the motor/pump housing and the circuit board cover.
- Short the test points next to the function you wish to test.

NOTE: New style test positions
ENTR = Position 0 (Red)
EXIT = Position 2 (Green)

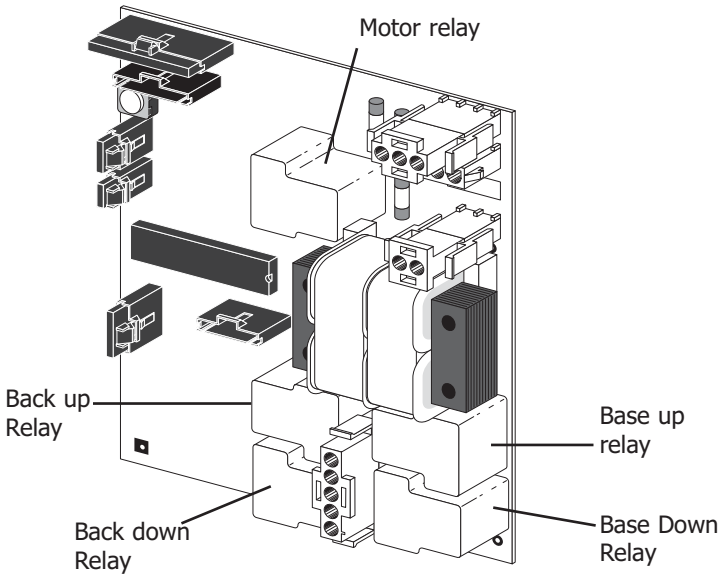
NOTE: Old style test positions
ENT = Position 0
EX = Position 2



NOTE: Connector P1 omitted for clarity.

Testing Relay Click

- When you activate any function, you should hear a clicking noise coming from the printed circuit board.
- The motor relay is activated only for base up and back up functions.



Printed Circuit Board Relays

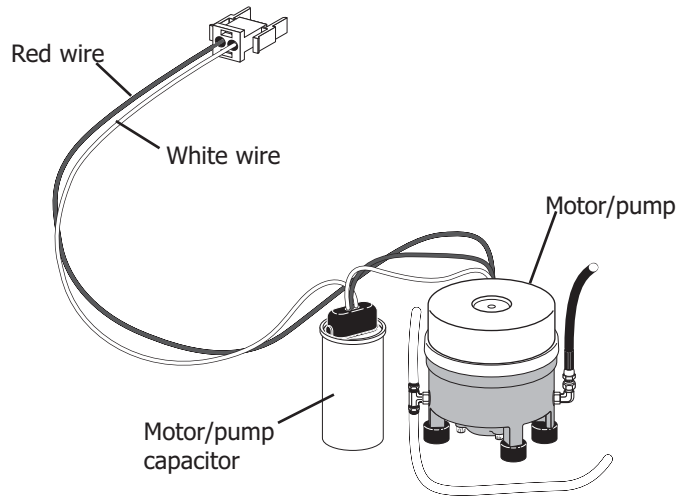
Testing the Motor/Pump

NOTE: This test requires the use of a current pickup probe.

- Clip the probe onto the red wire going to the motor/pump.
- Activate a base up or back up function.

Result: You should read 5 Amps (maximum) of current for 120V motor/pump.

You should read 2.5 Amps (maximum) of current for 240V motor/pump.

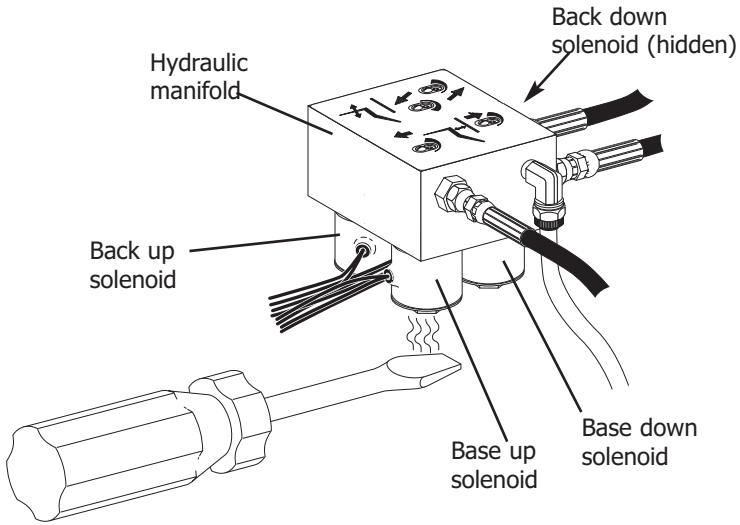


Motor/Pump Test

Testing Magnetic Pull

- While holding the tip of screwdriver near a solenoid, activate the appropriate chair function.

Result: You should feel the tug of the magnetic field generated around the solenoid.



Magnetic Pull Test

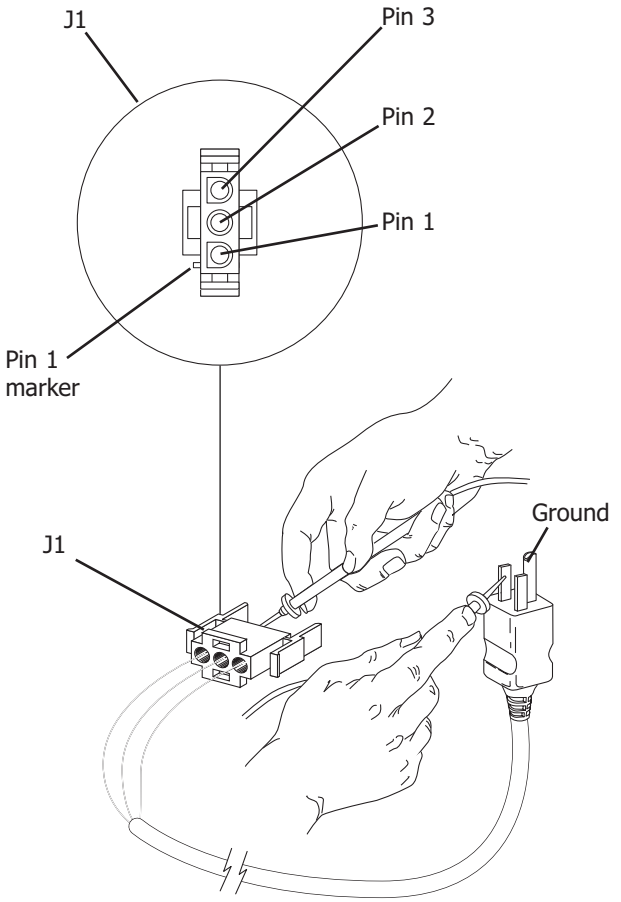
Testing Power Cord Continuity

WARNING

Hazardous AC voltages are present on the printed circuit board. Make sure power has been removed from the chair before proceeding. Failure to remove power from the chair may result in serious injury from electrical shock.

Follow these steps to test power cord continuity.

Task	Description
1	Disconnect the power cord (J1) from the chair printed circuit board.
2	Touch a volt-ohmmeter (VOM) probe to pin 1 of J1 and the other probe to first one and then the other blade of the power plug. Result: One blade should read 1/2 ohm or less, the other blade should read infinite (∞) resistance. If both blades read infinite (∞) resistance, the power cord is defective and must be replaced.
3	Touch a VOM probe to pin 3 of J1 and repeat the second step.
4	Touch a VOM probe to pin 2 or J1 and the other probe to ground on the plug. Result: The resistance should be 1/2 ohm or less.



Power Cord Continuity Test

Testing Limit Switch Continuity

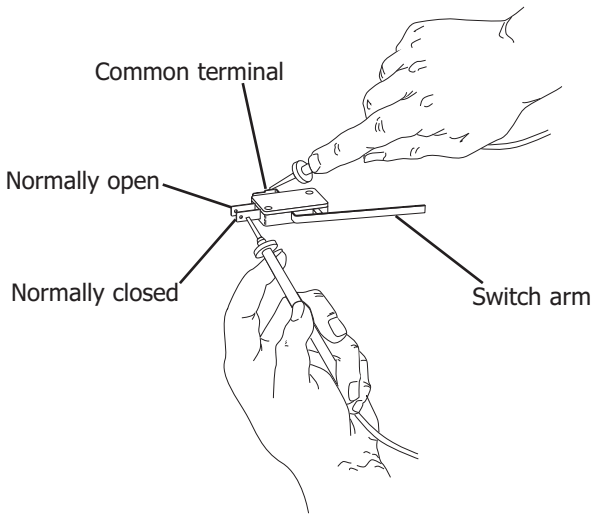
WARNING

Hazardous AC voltages are present on the printed circuit board. Make sure power has been removed from the chair before proceeding. Failure to remove power from the chair may result in serious injury from electrical shock.

Follow these steps to test limit switch continuity.

Task	Description
1	Disconnect the wiring harness from the limit switch. It is not necessary to remove the limit switch.
2	Touch a volt-ohmmeter (VOM) probe to the common terminal and the other probe to the normally open terminal and then to the normally closed terminal.
	Result: The normally closed terminal should give a reading of 1/2 ohm (Ω) or less.
	The normally open terminal should read infinite (∞)resistance.
	If both terminals indicate infinite (∞) resistance or indicate 1/2 ohm (Ω) or less, the switch is defective and must be replaced.

NOTE: If you are replacing a base up limit switch, adjust the switch after replacement (refer to Adjusting the Base Up Limit Switch).



Limit Switch Continuity Test

Testing Positioning Potentiometer Continuity

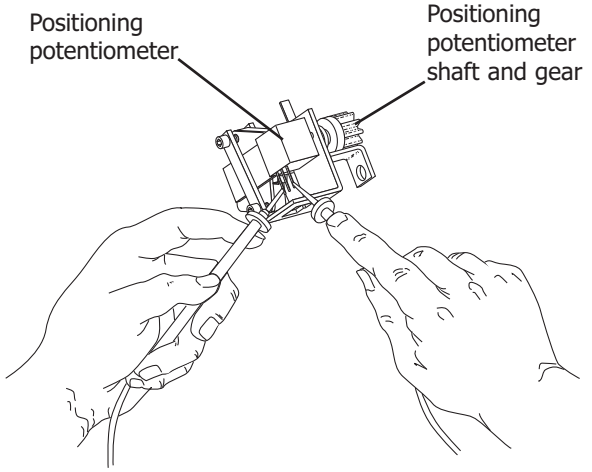
WARNING

Hazardous AC voltages are present on the printed circuit board. Make sure power has been removed from the chair before proceeding. Failure to remove power from the chair may result in serious injury from electrical shock.

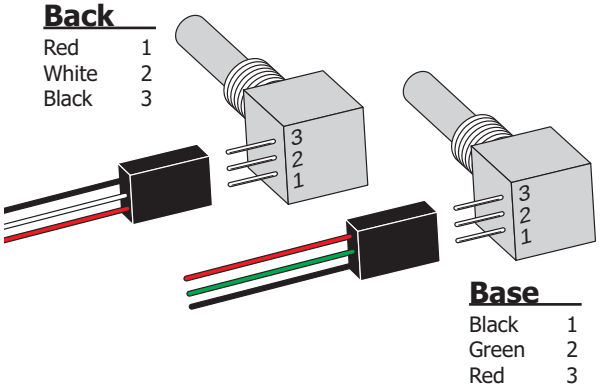
NOTE: If you are replacing a positioning potentiometer, refer to Adjusting the Base Positioning Potentiometer and Adjusting the Base Up Limit Switch.

Follow these steps to test positioning potentiometer continuity.

Task	Description
1.	Disconnect the wiring harness from the positioning potentiometer and remove the potentiometer assembly from the chair.
2.	Touch a volt-ohmmeter (VOM) probe to an outside pin of the potentiometer and the other probe to the other outside pin.
	Result: The resistance of the potentiometer should be approximately 4-6 KΩ (5KΩ+20%).
	If the potentiometer resistance is outside the limits, the potentiometer is defective and must be replaced.
3.	Move one probe to the center pin of the potentiometer.
4.	While observing the VOM, turn the potentiometer fully one direction and then the other.
	Result: Your VOM should indicate a smooth increase or decrease in resistance as you turn the shaft.
	If the resistance fluctuates in a jerky manner while the shaft is being turned, the potentiometer is defective and must be replaced.



Positioning Potentiometer Continuity Test



Cascade and Decade Positioning Potentiometer Wiring

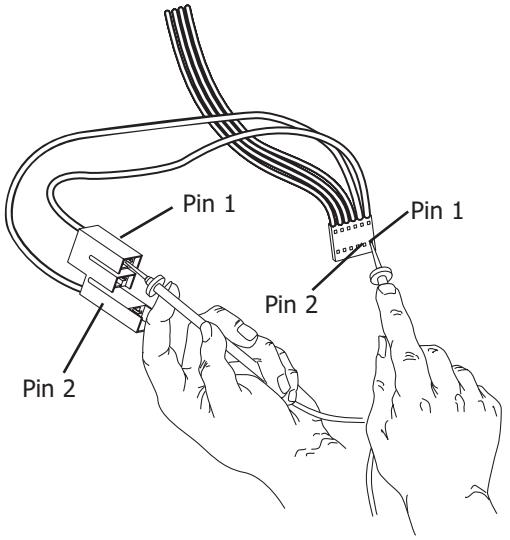
Testing Wiring Harness Continuity

WARNING

Hazardous AC voltages are present on the printed circuit board. Make sure power has been removed from the chair before proceeding. Failure to remove power from the chair may result in serious injury from electrical shock.

Follow these steps to test wiring harness continuity.

Task	Descriptions
1	Disconnect the wiring harness from the limit switch or positioning potentiometer and the printed circuit board. Do not remove from chair.
2	Touch a volt-ohmmeter (VOM) probe to pin 1 at one end of the harness and the other probe to pin 1 at the other end of the harness. Result: The VOM should read 1/2 ohm (Ω) or less. If the VOM indicates (∞) or fluctuating resistance, the harness is defective and must be replace.
3	Repeat the steps for each wire in the harness.



Positioning Potentiometer Continuity Test

Testing Solenoid Continuity

WARNING

Hazardous AC voltages are present on the printed circuit board. Make sure power has been removed from the chair before proceeding. Failure to remove power from the chair may result in serious injury from electrical shock.

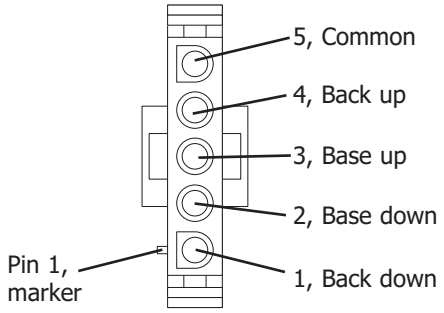
Use these points to test solenoid continuity.

- Disconnect the solenoid wiring harness (J10) from the printed circuit board.
- Touch a volt-ohmmeter (VOM) probe to pin 5 of J10 and the other probe to the pin for suspect solenoid.

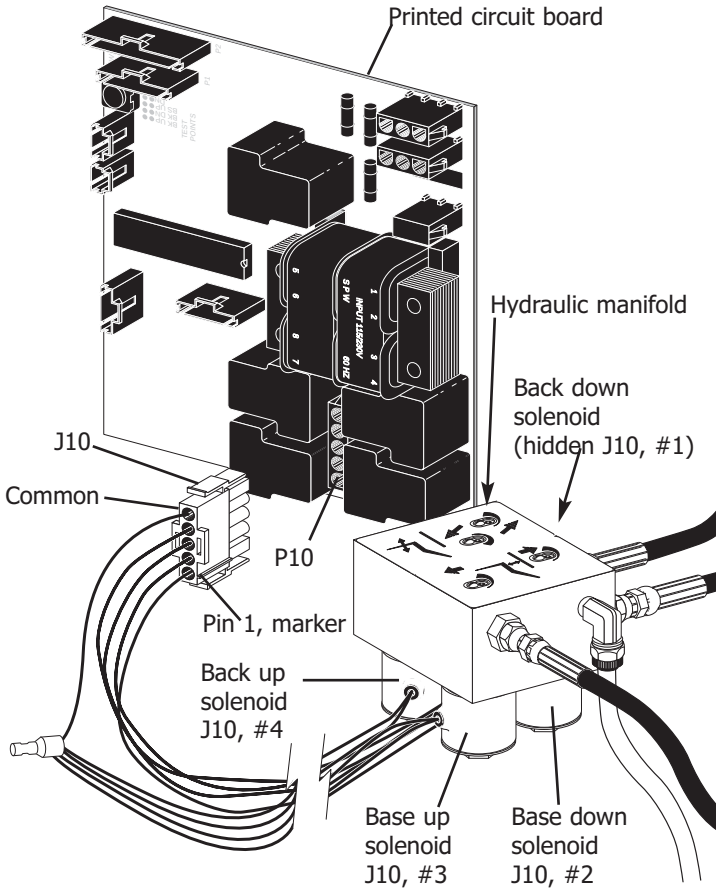
  Result: The resistance of the solenoid should be inside the range specified in the table.

  If the resistance is outside the specified range, the solenoid is defective and must be replaced.

Voltage	Resistance (Ω)	Range (Ω)
100V	220	200-250
120V	300	275-325
240V	1250	1100-1300



Solenoid Connector J10



Solenoid Continuity Test

Testing Base and Back Positioning Potentiometer Voltage

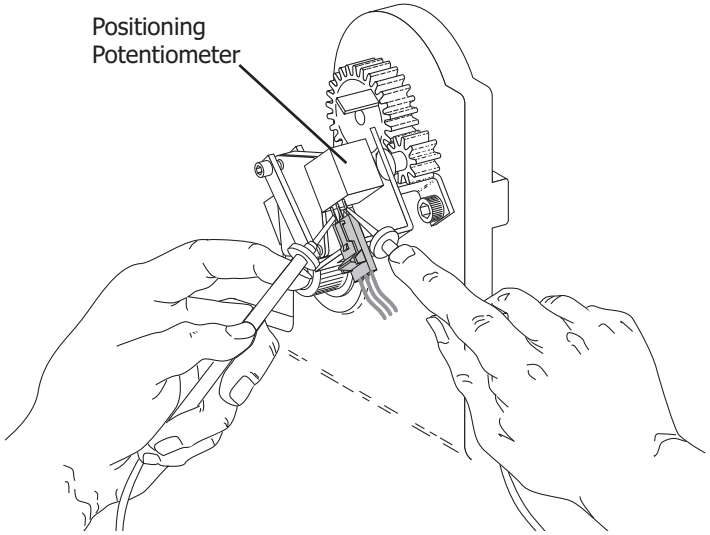
WARNING

Hazardous AC voltages are present on the printed circuit board. Make sure power has been removed from the chair before proceeding. Failure to remove power from the chair may result in serious injury from electrical shock.

- Touch the black probe of the volt-ohmmeter (VOM) to the top pin of the potentiometer and the red probe to the lower pin.

  Result: The voltage available should be approximately 5V (±1V).

  If the voltage is zero, the positioning potentiometer wiring harness or the chair printed circuit board should be replaced.



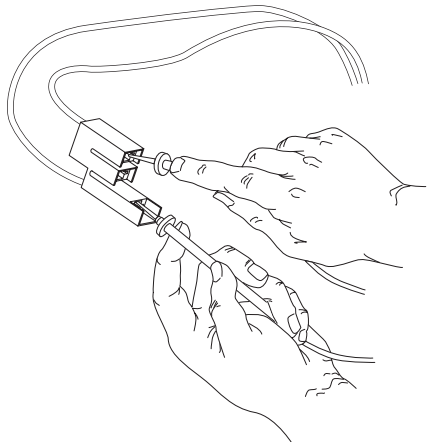
Positioning Potentiometer Voltage Test

Testing Limit and Stop Switches Voltage

- Disconnect the connector from the switch. Be sure to pull on the connector and not the wiring.
- Touch a volt-ohmmeter (VOM) probe to one pin of the connector and the other to the remaining pin.

  Result: The voltage available should be 5V (±1V) for PCBs with no LEDs, 12V (±1V) for PCBs with LEDs.

  If the voltage is zero, the switch wiring harness or the chair printed circuit board must be replaced.



Limit and Stop Switches Voltage Test

Chairs

Notes